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18 APR 1957
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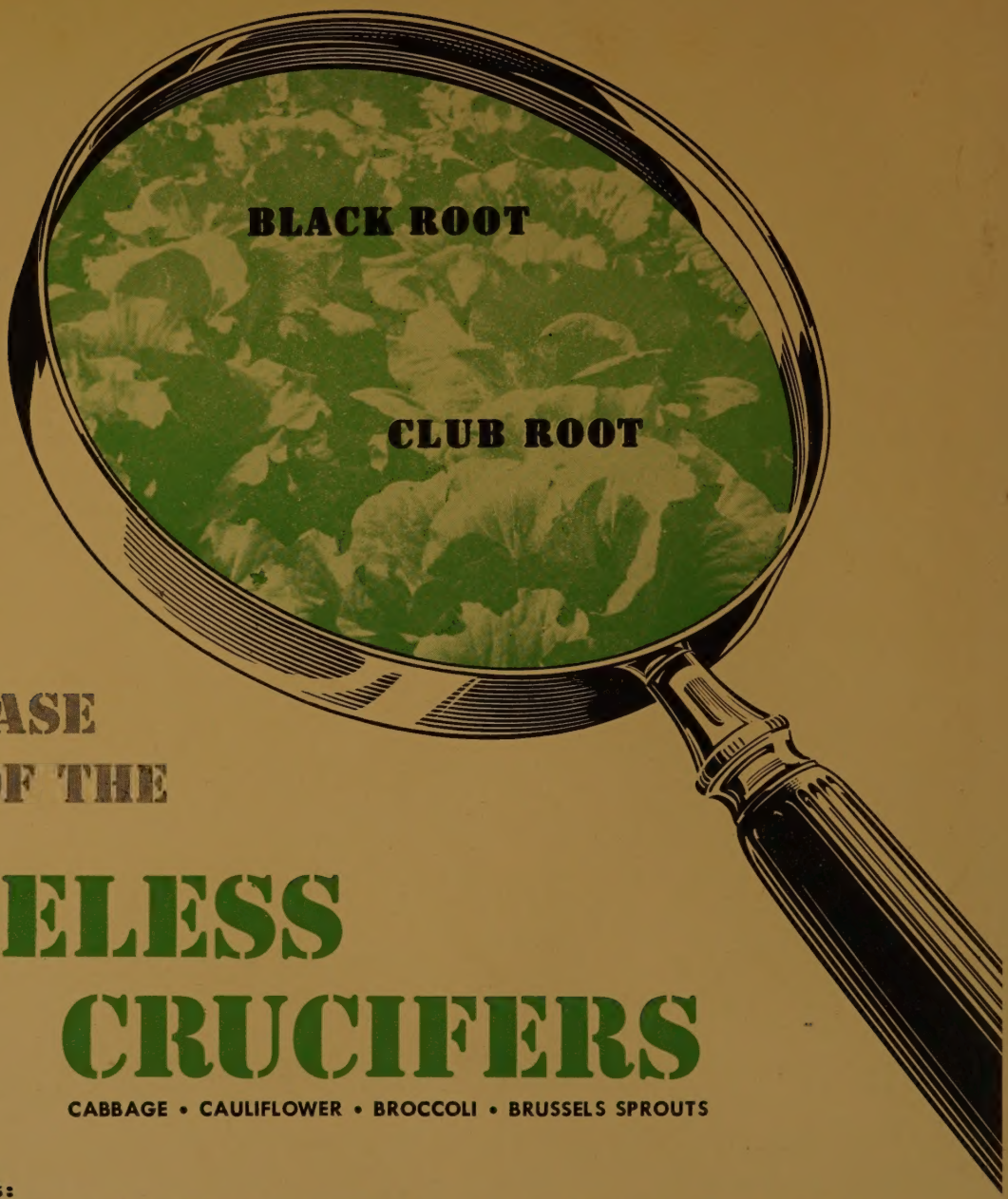
AGRICULTURAL *Chemicals*

NACA at Fairmont
San Francisco, March 6-8

ARCH 1957

In this issue: Protein Insect Baits • Pesticide Safety • Fertilizer Consumption Report • Lindane in Germany • 50 Years for Calspray • Custom Spray Operators School • Pacific Northwest Industry Meetings • WACA—A Review • 1956 Fungicide Tests

There's a Fungus Among Us



THE CASE OF THE

CARELESS CRUCIFERS

CABBAGE • CAULIFLOWER • BROCCOLI • BRUSSELS SPROUTS

Verdict:
County Court of Appeals finds Cabbage, Cauliflower, Broccoli, and Brussels Sprouts GUILTY as charged... guilty of growing in soil that is untreated by TERRACLOR—Olin Mathieson's new fungicide for certain soil-borne diseases . . . available as 10%, 20%, and 40% dust...75% wettable powder . . . 2 lb. emulsifiable. Mercy is not recommended since one application of TERRACLOR is often effective from planting time to crop maturity.

Sentence:
To be afflicted by the soil-borne diseases club root and black root...Potatoes, Alfalfa, Clover, Green Beans, Lettuce, Wheat, Cotton, and certain Ornamentals are also cautioned against growing in soil that's not treated with TERRACLOR lest they succumb to such soil-borne diseases as scab, damping-off, crown rot, root and stem rot, leaf drop, bottom rot, and common smut. Write for descriptive literature.

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takes 40,000 lbs. off a packer's shoulders

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- CONSTRUCTION
- SPECIFICATION CONTROL
- PLANT SURVEY

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AGRICULTURAL *Chemicals*

Vol. 12, No. 3 March, 195

AGRICULTURAL *Chemicals*

This Month's Cover

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That's why Chase supplies Multiwalls in such wide variety, in so many types and constructions . . . why the many Chase options—in papers, tapes, sewing—permit precise, money-saving selection.

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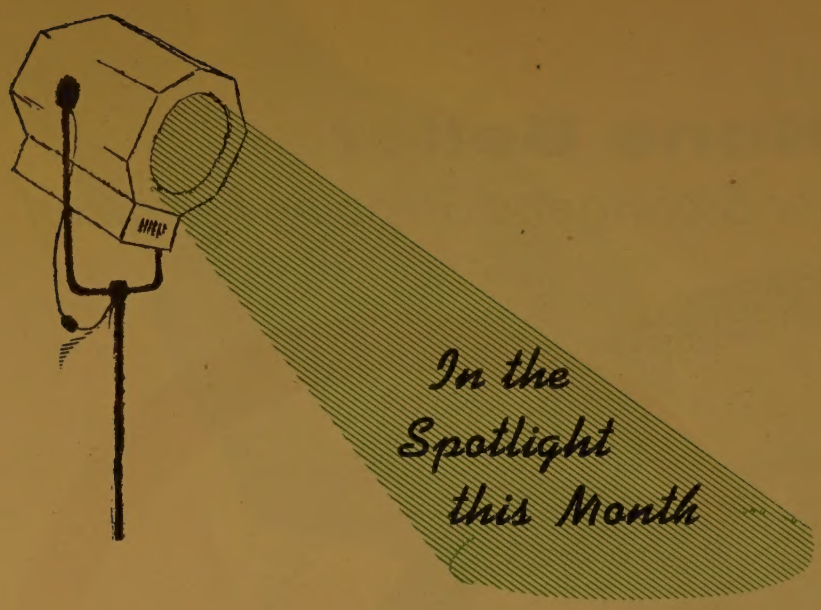


- **Baits, Attractants** . . . protein hydrolyzate organic phosphorus bait sprays are a new advance in the use of attractants in insect control. In Hawaii, superior control was achieved at a cost of 2 to 5 per cent of crop value. Bait sprays in current large scale application in Florida. Page 34.

- **Crop Protection in Germany** . . . Use of lindane in insecticide formulation in Germany reviewed in this story from Cela, gmbh. Page 36.

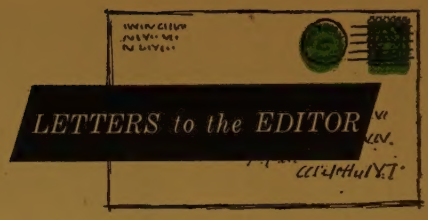
- **Fertilizer Consumption in '56** . . . Preliminary report for the year ended June, 1956, on consumption of fertilizers and plant nutrients in the United States shows decrease of 2.8 per cent. Page 49.

- **Corn Borer Control** . . . Twelve pounds per acre of 5 per cent DDT granules will be recommended for control of corn borer in 1957 in Illinois. Although effective, parathion will not be recommended for farmer use in control of spotted alfalfa aphid . . . trend will be to use of malathion at 10 to 15 ounces per acre. Page 40.

- **Calspray Reviews 50 Years** . . . In its 50th year of operation, Calspray reports on its contributions to pesticide technology. Page 42.

- **Onion maggot control** . . . Failure of DDT to control flies, raises question of 1957 recommendations. Heptachlor and dieldrin will be suggested in British Columbia; Washington growers will be using malathion, and in Idaho growers will use aldrin, heptachlor or dieldrin. Page 46.

- **Educating the Farmer** . . . Extension is "off campus" adult education. County agents assisted 6M families in 1955 . . . questions answered dealt primarily with pest control, fertilizers and new application methods. Page 38.



Can you tell us the complete address of *Veg News*, from which you have cited an article by Robert Kunkel, in your November, 1956 issue, pp 83-85. We would like to get a full reprint of Mr. Kunkel's address.

AKTIEBOLAGET EWOS
Sodertalje, Sweden

Mr. Robert Kunkel's original report appeared in *Cornell Veg News* published by Cornell University, Ithaca, New York.

I read with considerable interest the article in the January, 1957, issue of AGRICULTURAL CHEMICALS titled Safety with Phosphate Insecticides, written by C. Boyd Shaffer, American Cyanamid Company. This is the most explanatory article on the subject which I have seen.

I would like permission to reprint his article in its entirety.

Charles Montgomery
DIXIE LIQUID FERTILIZER CO.
Monroe, Louisiana

Thank you for your letter relative to our obtaining additional reprints of the article "Fertilizer Urea and its Properties."

We make excellent use of this article and feel it may be well to order a large quantity.

H. H. Tucker
SOHIO CHEMICAL CO.
Lima, Ohio

In the October issue of AGRICULTURAL CHEMICALS, of which we are subscribers, the writer read among other things the very interesting article about "Preharvest Killing of Vines" (pp 83-84).

Being engaged also in this line of agricultural products, we are interested in various spreaders such as the Tritons, Ultrawets, Vatsols, etc. briefly mentioned in your item. We should very much appreciate, if you would be kind enough to give us full names and addresses of suppliers of the spreaders of the type mentioned.

Philip Sandstrom
GULLVIKS FABRIKS AKTIEBOLAG
Malmo, Sweden

You will be interested in reading the enclosed letter from Dr. Houghland at Beltsville. He indicates that the article by Dr. W. U. Behrens, which I translated and which you published, apparently has been very helpful and suggestive to him in his study of phosphorus absorption by the potato plant. This is merely another instance of the fact that one never knows how an article published in AGRICULTURAL CHEMICALS will influence people. I expect to visit with Dr. Houghland in the near

(*Continued on Page* 135)

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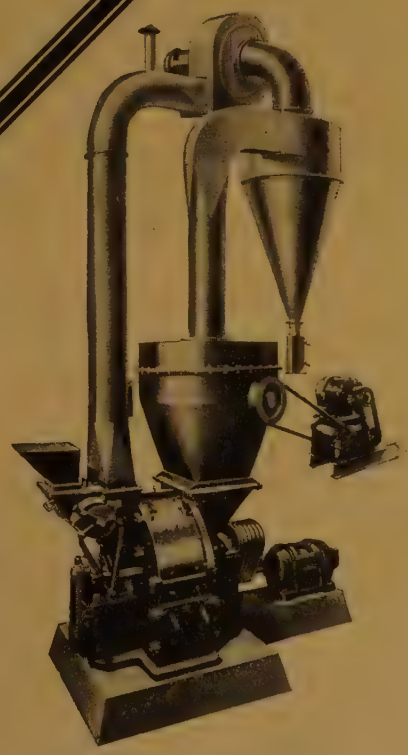

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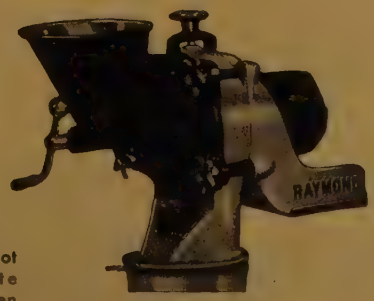

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This superior triple can be shipped in bulk, or International will be happy to have it bagged in adequate quantities under your own label . . . ship direct to your own dealers, too, if you like.

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- A modern, easy-to-use, top-performing triple super that will bring you increased customer satisfaction and plenty of repeat sales.
- The unbeatable convenience of distributing this high-quality product under your own brand name direct to your dealers without touching a single bag.

What's more, you'll find that dealing with International is a pleasure. You'll appreciate the friendly cooperation from International's transportation department . . . the fast service . . . and the reliability of supply.

See your International triple-super sales representative soon for complete details on minimum order requirements, price and delivery information. He'll be glad to show you samples. And one look at this new 0-45-0 will show you why you can't get a better deal than this new triple super now available for direct application sales.

**subject to minimum order requirements*

Profit now from this superior 0-45-0. Bagged under your own brand name.

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SEQUESTRENE Iron Chelates are available in 50-lb. drums, and 5-lb. bags.

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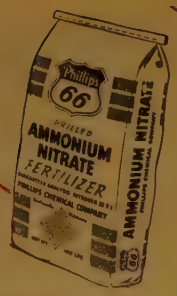

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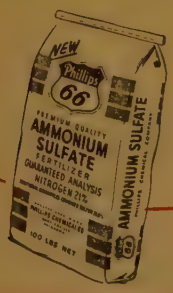
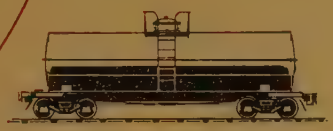
NITROGEN SOLUTIONS

Get more N per dollar! There are six Phillips 66 Nitrogen solutions for use in preparation of high-analysis fertilizers and the ammoniation of phosphate materials. Use these solutions to help keep manufacturing costs low; help rapid, thorough curing.



AMMONIUM SULFATE

New premium quality Phillips 66 Ammonium Sulfate contains 21% nitrogen, 23.8% sulfur. It is dry-cured to remove excess moisture, prevent caking. Uniform dust-free crystals flow freely, mix easily. Ideal for all analyses of mixed goods and for direct application. Available in bags or bulk.



ANHYDROUS AMMONIA

Phillips 66 Agricultural Ammonia containing 82% nitrogen is a convenient, economical source of nitrogen for the formulation of mixed fertilizers. Immediate tank car shipments are assured through Phillips production facilities in the Texas Panhandle and at Adams Terminal near Houston. Phillips also has tank car pools at many key points.

Phillips 66

PHILLIPS CHEMICAL COMPANY

A Subsidiary of Phillips Petroleum Company, Bartlesville, Oklahoma

Offices in:

AMARILLO, TEX.—*First Nat'l Bank Bldg.*
ATLANTA, GA.—*1428 West Peachtree Street*
BARTLESVILLE, OKLA.—*Adams Bldg.*
CHICAGO, ILL.—*7 South Dearborn St.*
DENVER, COLO.—*1375 Kearney Ave.*
DES MOINES, IOWA—*6th Floor, Hubbell Bldg.*
HOUSTON, TEX.—*1020 E. Holcombe Blvd.*
INDIANAPOLIS, IND.—*1112 N. Pennsylvania St.*
KANSAS CITY, MO.—*500 West 39th St.*
MINNEAPOLIS, MINN.—*212 Sixth St. South*
NEW YORK, N. Y.—*80 Broadway*
OMAHA, NEB.—*6th Floor, WOW Building*
PASADENA, CALIF.—*604 Citizens Bank Bldg.*
RALEIGH, N. C.—*804 St. Mary's St.*
SALT LAKE CITY, UTAH—*68 South Main*
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MIN CHEMISTRY *at work*

case: facts prove Attaclay® has highest performance characteristics as carrier for liquid toxicants

Processors label Attaclay a "natural" for liquid formulations because it provides a hundred cents worth of *carrying* for each carrier and diluent dollar.

Attaclay Carrier Report: Processing advantages include:

a. Great Sorptive Capacity in high or low concentrations, with either viscous or "watery" poisons

b. Produces Dust Bases, Wettable Powders that are dry, free-flowing, lump-free . . . promoting long life of blenders, mills, screens, conveyors

c. Rapid, Uniform Impregnation—agitates smoothly, cuts cycle times, speeds follow-up milling or grinding

d. Premium End Products which blenders, dealers and growers stamp "premium"

Our business is to supply low-cost, nature-given products that make things go smoothly in your plant . . . well in your markets. Use the coupon.

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I'm interested in a natural mineral product for_____

Send: ☐ Detailed "agchem" literature ☐ Free samples

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company_____

address_____

city_____ zone____ state_____

For more data, see Chemical Materials Catalog Pages 330-334

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Leaders in creative use of non-metallic minerals
ATTAPULGITE (*Attapulgus*)
ACTIVATED BAUXITE (*Porocel*)
KAOLIN (*Edgar • ASPs*)
LIMESTONE (*Chemstone*)
SPEEDI-DRI FLOOR ABSORBENTS

INDUSTRY MEETING CALENDAR

Mar. 4-5 — Western Cotton Production Conference, Hotel Westward Ho, Phoenix, Arizona

Mar. 6-8 — National Agricultural Chemicals Association, Fairmont Hotel, San Francisco

Mar. 11-12 — Southwestern ESA, Gunter Hotel, San Antonio, Tex.

Mar. 19-20—Georgia Entomological Society, Rock Eagle 4H Camp, Eatonton, Ga.

Mar. 27-29 — North Central Branch, Entomological Society of America, 12th annual meeting, Des Moines, Iowa.

April 2 — Western Agricultural Chemicals Association, spring meeting, Hotel Biltmore, Los Angeles.

April 14-15 — California Fertilizer Conference, fifth annual meeting, Fresno State College, Fresno, Calif.

May 20-22 — Chemical Specialties Manufacturers Association, Drake Hotel, Chicago

June 9-12 — National Plant Food Institute, The Greenbrier, White Sulphur Springs, W. Virginia

June 17-19 — Association of Southern Feed and Fertilizer Control Officials, 15th annual convention, Dinkler-Tutwiler Hotel, Birmingham, Alabama.

June 26-28 — American Society of Agricultural Engineers, Michigan State University, East Lansing, Mich.

June 26-28—Fertilizer Conference of the Pacific Northwest, Benson Hotel, Portland, Ore.

July 17-19—Southwestern Fertilizer Conference and Grade Hearing, Galvez Hotel, Galveston, Texas.

Sept. 8-15 — International Congress of Crop Protection, fourth international meeting, Hamburg, Germany.

Oct. 2-4—Beltwide Cotton Mechanization Conference, Shreveport, La.

November — Entomological Society of America, annual meeting to be held about the 3rd week of November. Dates not yet announced. Hotel Peabody, Memphis, Tenn.

Nov. 3-5—California Fertilizer Association, St. Francis Hotel, San Francisco, Calif.

Dec. 9-12 — Chemical Specialties Manufacturers Association, Hollywood Beach Hotel, Hollywood, Fla.

Jan. 13-15—1958 Weed Society of America and Southern Weed Conference, Peabody Hotel, Memphis, Tenn.

Jan. 21-23 — 1958 California Weed Conference, San Jose, Calif.

TRADE LISTING

National Agricultural Chemicals Association, Association Building, 1145 19th St., N.W., Washington, D. C. Lea Hitchner, executive secretary.

National Plant Food Institute, 1700 K St., N. W., Washington, D. C. Paul Truitt and Russell Coleman executive vice-presidents.

American Phytopathological Society, S. E. A. McCallan, secretary, Boyce Thompson Institute, Yonkers, N. Y.

American Chemical Society, 1155 16th St., N. W., Washington, D. C.

Association of Official Agricultural Chemists, P. O. Box 540, Benjamin Franklin Station, Washington, D. C., William Horwitz, secretary-treasurer.

Agricultural Ammonia Institute, Hotel Claridge, Room 305, Memphis, Tenn., Jack Criswell, executive vice president.

American Society of Agricultural Engineers, F. B. Lanham, secretary, 505 Pleasant St., St. Joseph, Mo.

Carolinas-Virginia Formulators Association, 516 S. Salisbury St., Raleigh, N. C. J. B. Maddrey, executive secretary.

California Fertilizer Association, Sidney Bierly ,executive secretary, Suite 1, Boothe Building, 475 Huntington Drive, San Marino, California.

Chemical Specialty Manufacturers' Association, 110 East 42nd St., New York City, Dr. H. W. Hamilton, secretary.

Entomological Society of America, 1530 P. Street N. W., Washington, D. C., R. H. Nelson, secretary.

Mid-West Soil Improvement Committee, 121 West Wacker Drive, Chicago 1, Ill. Z. H. Beers, executive-secretary.

National Nitrogen Solutions Association, 2217 Tribune Tower, Chicago, Ill. M. F. Collie, secretary.

National Cotton Council, PO Box 9905, Memphis, Tenn.

Weed Society of America, W. C. Shaw, secretary, Field Crops Research Branch, Beltsville, Md.

Western Agricultural Chemicals Association. Charles Barnard, executive secretary, 2466 Kenwood Ave., San Jose, Calif.

MIN CHEMISTRY *at work*

case:

How Granular Attaclay® helps you to manufacture. . . and market

M & C—looking ahead—offers a granular carrier that *helps you market more effectively* in this attractive but competitive field.

Granular Carrier Report: Specific *marketing* advantages include:

(1) Ultra uniform particles; (2) clean-cut premium appearance; (3) no caking in storage; (4) excellent poison release properties, no clog or waste, easy to apply, reduced costs to the grower; (5) what's in *your* bag is the *known, trusted* product of the major *original* supplier of granular carriers.

Specific processing advantages:

(1) Ideal properties, highly sorptive, works well with toxicants, resists breakdown; (2) easy to formulate and package; (3) across-the-board use in pesticides, herbicides, fungicides, soil fumigants.

Going Granular? We're geared to supply nature-given *process-engineered* materials that will ease production and aid sales. Use the coupon.

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I'm interested in a natural mineral product for_____

Send: ☐ Detailed "agchem" literature ☐ Free samples

name_____ title_____

company_____

address_____

city_____ zone____ state____

For more data, see Chemical Materials Catalog Pages 330-334

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CORPORATION OF AMERICA
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Leaders in creative use of non-metallic minerals

ATTAPULGITE (*Attapulgus*)
ACTIVATED BAUXITE (*Porocel*)
KAOLIN (*Edgar • ASPs*)
LIMESTONE (*Chemstone*)
SPEEDI-DRI FLOOR ABSORBENTS

We time phosphate deliveries to meet your needs

Cyanamid gives you at-the-mine order service that cuts demurrage, delivers phosphate rock when you need it . . . as you need it!

No side-tracking of orders in "head" or "branch" offices when you call, wire or write Cyanamid. Your order goes direct to point of shipment, Brewster, Florida, for immediate processing.

Our traffic experts are experienced at routing to eliminate avoidable delay . . . another service that cuts demurrage, yet keeps your plant humming.

Cyanamid's Technical Staff is on call whenever you need it. Let us help you solve knotty manufacturing problems. Call or write for this free service.

As for grade . . . all our production is high grade, ranging from 77% B.P.L. down to 72% B.P.L. Our rock is quality controlled by specialists and blended to your specifications. Rock is also ground to order and a screen analysis of each car sent to the customer before shipment.

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PRODUCERS OF: *Aero® Cyanamid: Fertilizers—Defoliants—Herbicides* *Aeroprills® Ammonium Nitrate Fertilizer*
Aero® Ammonium Sulphate *Amanol* Nitrogen Solutions* *Amino Triazole Herbicide and Defoliant* *Anhydrous Ammonia*
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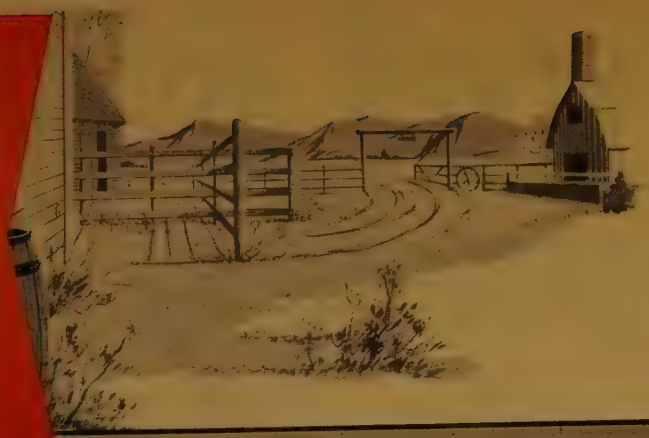
Cyanogas® Calcium Cyanide Fumigants *Potassium Cyanate Weedkiller for Agriculture and Turf* **Trade-mark*

4 easy ways to destroy weeds



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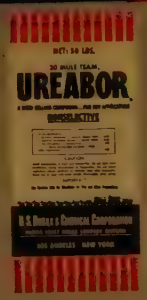
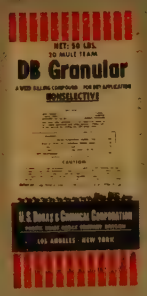


UREABOR®

Nonselective. A granular complex of sodium borate and substituted urea... dust-free...for DRY application. Low rates of application are a big feature.

The PCB Spreader applies the low rates to best advantage and is available for $10.75 delivered anywhere in U.S.A.

2

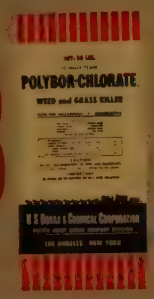


DB® Granular

A scientifically balanced formulation of 2,4-D and sodium borates...for DRY application. Kills deep-rooted noxious weeds—perennials and annuals—effectively and economically. The recommended low rates can be applied best with the special hand operated PCB Spreader.

(Not intended for control of grass)

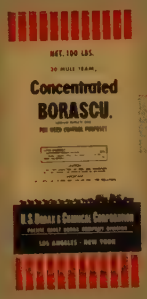
3



POLYBOR-CHLORATE®

A highly soluble powder for spray or dry application. Its double action quickly destroys vegetation on contact and through root absorption. Provides long residual effects. This is a general nonselective herbicide for controlling all types of vegetation.

4



Concentrated BORASCU®

A granular concentrated sodium borate ore for nonselective control of weeds and grasses. It is easily applied, by hand or with mechanical spreaders, in its dry form. Long residual action is a feature—may prevent regrowth for a year or more.

Whether you are concerned with Agriculture or with Industry...you need **BORATE WEED KILLERS**

Weeds incur danger and great economic losses...they steal from crops...they constitute a fire hazard without equal. Nonselective BORATE weed killers attack this menace most effectively by destroying roots and rhizomes and preventing regrowth for long periods. During our lengthy experience with borates for weed control, we have developed special weed killers capable of destroying all types of weeds and grasses under the many various local and regional conditions.

YOU GET ALL THESE FEATURES:

- NONSELECTIVE HERBICIDAL ACTION
- RESULTS THAT ARE LONG-LASTING
- EASY APPLICATION AND CONVENIENCE
- EFFICIENCY AND ECONOMY
- SAFETY—Nonpoisonous, Non fire-hazardous
- WON'T CORRODE ferrous metals

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Pacific Coast Borax Co. Div., 630 Shatto Place, Los Angeles 5, Calif.

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☐ UREABOR® ☐ DB® Granular
☐ POLYBOR-CHLORATE® ☐ Concentrated BORASCU®

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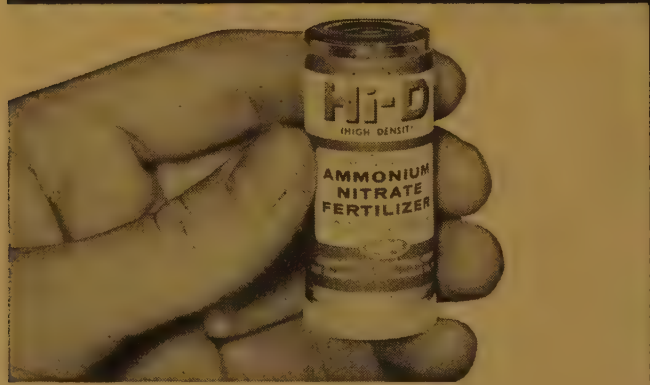
COMPANY _____

ADDRESS _____

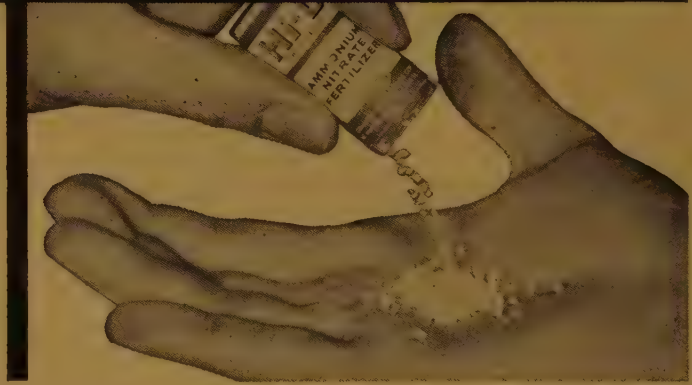
CITY _____ ZONE ____ STATE ____

NEWEST NITROGEN FERTILIZER

at your dealer's now!



see a sample at your dealer's



no other ammonium nitrate like it!

Ask your dealer for a sample. See for yourself the advantages of using new Hi-D. An exclusive patented process produces a high density ammonium nitrate with the maximum moisture "squeezed" out. Hi-D is made dry, coated dry and bagged dry. In addition, the controlled size and unique shape of these new granules assure even distribution in all types of spreading operations under all field conditions. Hi-D flows freely, spreads evenly, stays put. It won't gum-up, clog, cake or bridge even on hot, humid days.

Hi-D Ammonium Nitrate contains the 2 key types of nitrogen — the kind of nitrogen in sodium nitrate *and* the kind in ammonium sulphate as well! That's not all. 100 pounds of Hi-D gives you as much nitrogen as 159 pounds of ammonium sulphate or as much nitrogen as 209 pounds of sodium nitrate! The total nitrogen in Hi-D, guaranteed at 33.5%, gives 2-speed fertilizing action. 16.75% *nitrate* nitrogen goes to work fast for good, vigorous starts. 16.75% *ammonia* nitrogen follows up later for a sustaining boost to growth.

There's another kind of value in Hi-D, too. Its high density means less bulk — 10 bags stack in the same space as 8 bags of other types of nitrate. In the field this means you get up to 25% more nitrogen from a normal hopper load — you cover more ground per load.

Put the crop-boosting power of Hi-D to work for you this season. And remember, Hi-D should be just one part of your program for productivity. Don't forget — there's no substitute for balanced fertilizers. And, as a nitrogen supplement to the balanced fertilizer your dealer recommends, there's nothing better than Hi-D. See your dealer. Ask for Hi-D — in the green and white bag. You can trust Hi-D in the field and in the yield.

COMMERCIAL SOLVENTS CORPORATION — STERLINGTON, LA. — ST. LOUIS, MO. — ATLANTA, GA. — TERRE HAUTE, IND.

LOOK TO EMCOL

emulsifiers for all applications

INSECTICIDES

EMCOLS H-300X/H-500X

New Emulsifier "team" with many advantages in combination with Aldrin, BHC, Chlordane, DDT, Dieldrin, Endrin, Heptachlor, Lindane, Toxaphene, and others.

sludge-free HERBICIDES

EMCOLS H-700/H-800

Another new "team" advantageously used for Hi and Lo-Volatile Esters of 2, 4-D and 2, 4, 5-D . . . for Esters of MCP.

to mix Liquid FERTILIZERS and Liquid PESTICIDES

EMCOLS H-A and H-B

Now, with practically no limitations, you can *field-mix* Liquid Fertilizers and Liquid Pesticides.

Emulsifiable Concentrates

Aldrin, BHC, Chlordane, Dieldrin, Endrin, Heptachlor, Nemagon.

Liquid Fertilizers

Aqua Ammonia, Phosphoric Acid, Most NPK Ratios (Nitrogen, Phosphorus, Potassium).

Serving Agriculture and Industry with dozens of EMCOL emulsifying agents.

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division of Witco Chemical Company

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COPPER—the IDEAL FUNGICIDE

We are miners of Copper bearing ores, from which is produced in our integrated plants a wide variety of Copper Chemicals. Our technical know-how and basic position in Copper, along with our years of experience in agricultural fungicides, is your assurance of exacting quality control, strict uniform consistency, a plentiful supply and outstanding performance in the field.

COPPER CONTROLS

COPPER UNLIMITED SHELF LIFE

COPPER IMPROVES QUALITY

COPPER PROTECTS LONGER

COPPER PLENTIFUL

COPPER RELIABLE

COPPER SUPPLIES TRACE ELEMENT

COPPER ECONOMICAL

COPPER EASY APPLY

COPPER SAFTENS STORAGE

Quality Controlled From Mine to Finished Product

COPPER PROFITABLE

COPPER COMPATIBLE

TENNESSEE TRI-BASIC COPPER

Time Tested and Commercially Proven the Superior Fungicide

For further information please make requests on your company's letterhead.

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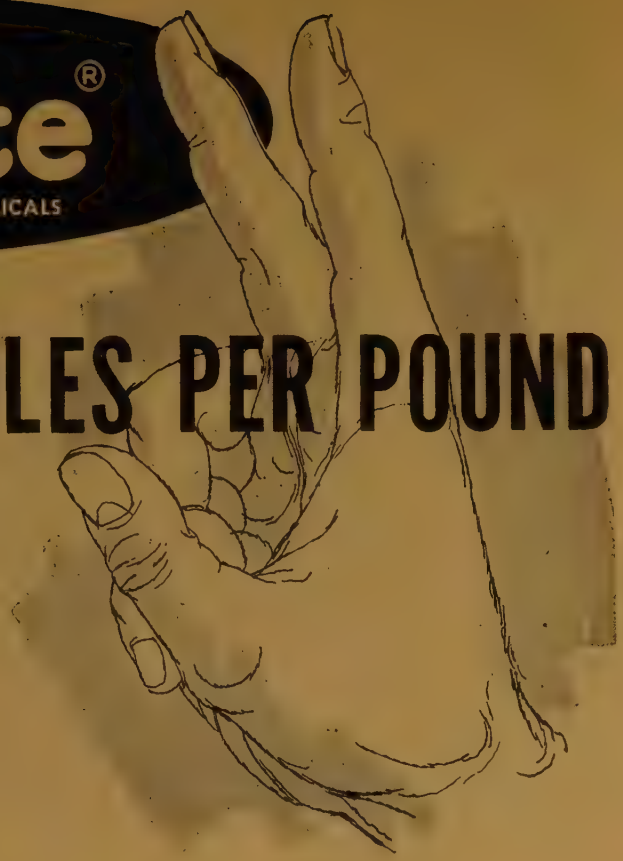
Terra-Lite®

VERMICULITE CARRIER FOR AGRICULTURAL CHEMICALS



TWICE THE GRANULES PER POUND

★ Cuts Carrier Costs
★ Increases Coverage
★ Approved by Ag-Chemical Companies

With twice the granules per pound Terra-Lite vermiculite carrier offers high, even absorption... formulates easily without caking or balling, even at high concentrations...gives better toxicant diffusion.

Versatile Terra-Lite was first used as a chemical carrier over seven years ago. Today it helps to combat weeds and soil pests in lawns; iron chlorosis in citrus groves; and insects and weeds in farm application. Leading producers of agricultural chemicals heartily endorse it. This free-flowing, wide-covering mineral is the way to develop business for yourself in the booming new granular field!

There are over 40 Terra-Lite processing plants in the U. S. and Canada, including the one near you. Write today for FREE sample and formulating instructions, plus address of nearest plant.

DEVELOPS New Business For You in the Great and Growing Granular Field

Free to formulators

Let us send you FREE inspection sample and formulating instructions.

GET A FREE SAMPLE

Terra-Lite® DIV., ZONOLITE COMPANY

Dept. AC-37, 135 S. LaSalle St., Chicago 3, Ill.

Send me FREE sample of Terra-Lite granular carrier and formulating instructions. Also send me field studies on commercial use, and address of nearest Terra-Lite plant.

Name_____

Firm_____

Address_____

City_____ Zone____ State____

the wetter—the better!

get better coverage—uniform wetting and increased kill with low cost

Nacconol®
as the wetting agent

Nacconol is now available in a physical form to fit your every need, to save you time and money in your manufacturing process—to give your products the all important wetting and sticking properties that increase the kill and increases your sales.

For samples, prices and suggestions on formulations, write, wire or phone our nearest office.

Nacconol

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Crops and Robbers

Give your row crop acres the best of protection with these exclusive NIAGARA formulations. Enjoy better yields. Always available fresh and in full toxic strength. See your local NIAGARA field man.

C-O-C-S FUNGICIDE

This natural copper fungicide is the old favorite dust or spray material for thousands of growers. Effectively controls blight, mildew, leaf spot.

CHLORO IPC WEED KILLER

A pre-emergence weed control material for snap and lima beans, lettuce, peas, onions, spinach and others. Post-emergence on onions, also.

CHLORDANE DUST OR SPRAY

One of the most effective insecticides known. Controls cutworms, wire worms, grasshoppers, maggots, ear wigs, beetles, leaf miners and others.

NIACIDE "Z"

A new and highly effective organic fungicide for the control of anthracnose, early blight and septoria on tomatoes.

PYRENONE DUST

A relatively non-toxic insecticide for application to vegetable crops where the use of materials such as DDT is not permitted.

BEDRENCH

A new, effective seedbed drench. Controls weeds, insects, nematodes, and damping-off. For tobacco, vegetables, flowers and nursery beds.

Niagara DUSTS and SPRAYS

Niagara Chemical Division

FOOD MACHINERY AND CHEMICAL CORPORATION

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WHEN YOU BUY Niagara YOU BUY PROTECTION

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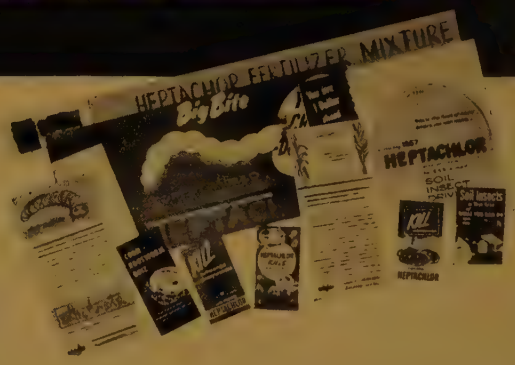
featuring



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THE "STOP 'EM DEAD AND BE $$ AHEAD" HEPTACHLOR SOIL INSECT CAMPAIGN

. . . complete, unified, intensive promotions including farm papers, newspapers, dealer promotional material, direct mail and strong national publicity! Here's real power to back up your selling in key areas throughout the country!

Followed by . . . SEED TREATMENT CAMPAIGN • COTTON INSECTS CAMPAIGN VEGETABLE INSECTS CAMPAIGN • TOBACCO INSECTS CAMPAIGN . . . and many other bigger and better than ever special regional promotions!

ALL THIS PLUS HEPTACHLOR'S PROVEN SUPERIORITY!

Heptachlor's ahead on preference, demand, and proven performance! It's accepted by state and Federal experiment stations, proven by years of successful use in the field, and in demand with farmers everywhere for its economy, ease of use, and versatile effectiveness!

HEPTACHLOR FORMULATORS ACT NOW! Tie-in now for the hottest selling year you've ever had! Mail this coupon now for complete information!

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☐ Forage Insect Campaign ☐ Soil Insect campaign
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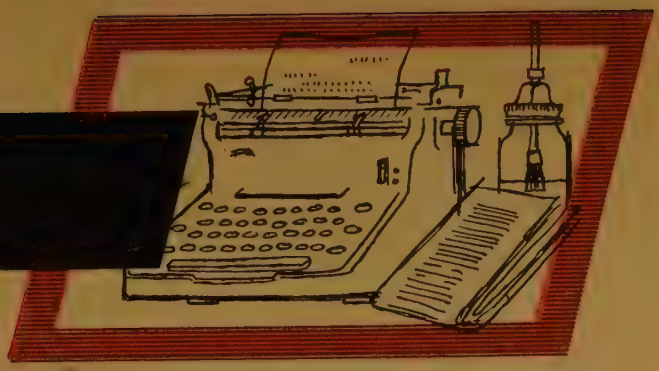
EDITORIALS



WITH the problem of resistance of cotton pests to the chlorinated hydrocarbon insecticides a matter of major concern to cotton farmers and those charged with responsibility for pest control, there will apparently be a big swing this season to use of methyl parathion in many areas where "hard to kill" pests were encountered last season. Use of methyl parathion in cotton pesticides increased ten-fold last season and the prediction has been made that there will be a further big expansion in use this season. There are now at least six producers, compared with one a year ago, and ample supplies of this more potent pesticide will be ready the '57 season to combat resistant pests.

Whether or not formulators and applicators will be ready to handle these more hazardous pesticides is quite another matter however. We doubt that they will be, and we offer the prediction that there will be needless fatalities in the cotton belt this season if steps are not taken,—and promptly—to prepare for the new toxicant.

Parathion is capable of thoroughly safe use, as has been demonstrated, but a different set of rules applies than those with which workers in the cotton belt may be familiar. If they handle parathion dusts the same way they have been using DDT, BHC, Toxaphene or calcium arsenate, as many of them are certain to do if they are not strongly instructed otherwise, there will inevitably be needless fatalities. Unless it moves rapidly to meet this threat, the insecticide business can anticipate a series of black marks on its present very good safety record in the area.

Education is needed in advance of opening of the season, both at the formulator and the applicator level. A series of informative articles in the local press and in local agricultural publications, warning posters widely distributed, and industry-sponsored meetings in the areas concerned, all banging away on the safety theme, would probably keep trouble at a minimum.

The matter, as we see it, is one in which the National Agricultural Chemicals Association could very logically take the lead, or if the project is considered to be not sufficiently wide in scope for full industry action, at least the half dozen basic producers of methyl parathion should take steps at once to safeguard the good name of their products and the lives of its users.

THE long-continued annual gain in fertilizer consumption in the United States has finally been interrupted. A year ago, when the preliminary report on U. S. fertilizer consumption for the year 1954-55 was made public by the U.S.D.A., a decline was noted in fertilizer tonnage for the first time in some 15 years, but, because of the continuing rise in analysis of products sold, consumption of plant nutrients edged up to a new peak. This year, however, the story is different. As reported elsewhere in this isue (page 49) not only did consumption of fertilizers in the United States and Territories decline some 2.8%, but consumption of plant nutrients also dropped 0.6%,—the first such decline in seventeen years.

A number of patterns in fertilizer use are obvious from study of details of this report, most of them a continuation of trends already apparent in previous years. Concentration of products continues to gain. Average primary nutri-

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Western Agricultural Chemicals Association . . . .

WESTERN Agricultural Chemicals Association has served the industry longer than any other trade association in its field. Twenty-eight years ago a group of Westerners in the insecticide business decided that problems which were common to all could be solved best by cooperative actions; and on March 11, 1299 they organized the California Insecticide Manufacturers' Association. In 1934 it was incorporated as the Pacific Coast Insecticide Association. In 1941 the name was changed to Pacific Insecticide Institute and, as "P.I.I." it was known until, in 1951, changing conditions caused renaming to Western Agricultural Chemicals Association.

Since the passing of Eugene T. Doyle, Western Manager for Diamond Black Leaf Company, in December, 1956 only one of the eleven directors appointed at the birth of the organization is still associated with the manufacture of pesticides. He is Wallace Durham, president of Durham Chemical Company, Los Angeles, California. Mr. Durham recently disposed of his majority interest in Quimica Agricola del Pacifico S. A. de C. V. in Mexicali, Mexico and announced expansion of Durham Chemical Company's Southern California sales force. His company still is an active member of W.A.C.A.

On May 15, 1954 the Western Association lost by death its valued secretary-treasurer, Mr. William D. Gray, who had served in that capacity since 1944. W.A.C.A.'s directors were confronted with the task of selecting a replacement. In the interim "Gene" Doyle served as treasurer.

It happened that only fifteen days prior to the passing of William Gray, Mr. Charles O. Barnard, one-time western sales manager for American Cyanamid's Insecticide Department, had reached automatic retirement age after twenty-five years of service with that company; and it now appears that his availability and suitability for the job occurred almost simultaneously to nearly all of the men who were then the directors of W.A.C.A.

Mr. Barnard had departed for a four months' trip through the country; but was located in Canada and invited to discuss the matter. He recalls now that he "hadn't loafed long enough to crave work," but in September, after "having practically nothing to think about when each morning came around," he was ready, the directors of W.A.C.A. were still waiting, and on October 1, 1954 he became the Association's secretary-treasurer. The title was later changed to executive-secretary and treasurer.

A rather bleak picture of the affairs of the Association had been painted by the directors. The challenge, however, was interesting to one who, according to the book, should have been ready to sit in a rocking-chair and idly watch the parade. The roster showed only forty-one members in late 1954; today there are sixty-eight — close to the maximum available because W.A.C.A. is a regional organization confined to the eleven western states. In four of those states there are no local eligibles and there is only one eligible in each of three other states; so the membership is virtually confined to Arizona, California, Oregon and Washington.

The current non-paid officers of W.A.C.A. are A. F. Kirkpatrick, president, and Harvey M. Bales, vice-president. Kirkpatrick is western entomologist for American Cyanamid Company. He has served that company for 33 years. Bales is manager of the Arizona Pest Control Company in Glendale, Arizona.

Ten members of the directorate are representatives of basic producers; five represent formulators. They are Bales, Burden of United-Heckathorn, Thomas Castle of A. L. Castle, Inc., Cody of Calspray, Colbern of Coastal Chemical of California, Davis of Los Angeles Chemical, Eichmann of Stauffer (Portland), Garner of Pacific Guano, Hitchcock of Chemagro, Kirkpatrick, Madsen of Olin Mathieson, Neal of Hercules, Piguet of Sunland Industries, Inc., Sime of Chipman (Portland), White of White Chemical (Phoenix), and Barnard, ex officio.

No trade association in the field could function effectively without the support of "big" companies, and the manufacturers of basic agricultural chemicals form the largest group of W.A.C.A.'s membership. The next largest group is comprised of formulators engaged in interstate commerce; then a group of formulators operating intrastate. A relatively new membership group is the affiliates — suppliers of solvents, diluents and containers. The benefits derived from participation of the affiliates are decidedly mutual.

Contrary to a certain measure of popular opinion, trade associations

a report on the functions history, activities of this organization

do not exist for the purpose of fathering "good-time-Joe" gatherings. Conventions serve useful purposes but the values thereof are incidental rather than primary. When Mr. Barnard was asked to state the purposes of W.A.C.A. he replied: "They are what they were when the Association was started," and quoted from W.A.C.A.'s Articles of Incorporation:

"1. To advance the goodwill of the agricultural chemicals industry by disseminating information for the education of the public.

"2. To advance the methods, improve the products, and enlarge the scope of the agricultural chemicals industry by procuring scientific and technical information for distribution to persons interested therein.

"3. To assist and cooperate with legislative and regulatory bodies and administrative agencies in determining necessary and progressive legislation and regulation relating to or affecting the agricultural chemicals industry.

"4. To perform such functions as shall be necessary and proper for the attainment of the stated objectives."

Mr. Barnard then said that "no trade association, as such, can 'improve the methods' or 'improve the products' of a section of the chemical industry which produces the highly toxic compounds now required to protect crops against the ravages of insects. Only the research and technical staffs of the various producers can improve methods and products. But W.A.C.A. is constantly striving to accomplish the other stated purposes."

The operational economics of W.A.C.A. require that details of the attainment of the Association's purposes devolve largely upon its secretary as the only paid officer. So Barnard accepts invitations to address organizations which, in one way or another, are engaged in activities pointed toward the betterment, or the servicing, of agriculture. Within recent months he has appeared before the Association of American Pest Control Officials in Washington, D. C., the California Association of County Agricultural Commissioners, the Dusters and Sprayers Conference in Walla Walla, Washington, and the open meeting of the Pacific Northwest Spray Project Conference in Portland, Oregon. His talks were either in the interest of effective and safe use of pesticides or the promotion of good relations between the pesticide industry and governmental, college and university scientific workers.

"Basically," declared Mr. Barnard, "pesticide manufacturers and distributors, ground and air service applicators, all regulatory officials, the producers of row and field crops, the horticulturists and the vineyardists, the dairymen and the forage crops growers, the fertilizer industry and even the bankers, form a great non-unified enterprise for the production of foods and fibers. Even though thousands of separate economic entities comprise the whole endeavor, we all are — and we all must be — cooperators.

"Take the matter of regulatory legislation," he added. "We must find workable balances between regulatory compulsions and physical and economic practicalities — adjustments and modifications which will permit scientific workers to conduct effective research, allow agriculturists to produce and market crops without dire danger of confiscation, not strew the pathway of the manufacturers of essential pesticides with technical and economic barriers too formidable to chance hurdling, and still adequately protect the consuming public against contaminated foodstuffs. A constant succession of most difficult related problems confronts all of us who are in any way concerned. To solve these problems all parties at interest must cooperate in good faith. There is no alternate road."

The membership of W.A.C.A. receives, through its official representatives and other personnel in district and home offices, a Newsletter about every two weeks. Newsletters which do not pertain to Association business are also sent to approximately 125 State and County agricultural officials and Extension Service workers in the eleven western states — a practice which is surprisingly helpful to better understanding and good relationships. Newsletters may be one or fifteen pages in length but all have one quality in common: content helpful to at least some of the industry personnel who receive them. A Newsletter may be a report of a meeting, a speech by an authority on a subject of current interest, some pertinent statistics, a message from U.S.D.A. or the Food and Drug Administration, or just something that, in Barnard's opinion, is worth saying. "Most of my life I have been accused of talking too much," said Barnard. "Now I say some of it with a typewriter."

A primary responsibility of every trade association is to keep informed of legislative and regulatory actions at all levels of government — Federal, State, County and municipal—which may affect its membership directly or indirectly. W.A.C.A.'s policy in such matters is full cooperation with the National Agricultural Chemicals Association — and also with the State associations within its orbit if so doing will not jeopardize the dominant aspect of industry cohesion.

To keep the Association's finger on the legislative and regulatory pulses of the States within its area of activity its legislative committee of twenty-one members is divided into three sections — Northwest, Central and Arizona-Southern California.

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INSECT Attractants

BAITS or attractants used in combination with insecticides are not new. They have been used for many years in the control of houseflies and other insects. Through the addition of attractants, the effectiveness of various insecticides is increased by drawing pests to the poison, encouraging ingestion and offsetting any repellent qualities which the poison may possess.

Bran plus sweetening agents, such as sugars and molasses, have been used in combination with lead arsenate and other arsenic compounds against grasshoppers. Other baits used with varying success against a variety of insects include malt, yeast, vinegar and essential oils.

The development of malathion and other organic-phosphorus insecticides was a prerequisite for the current interest in bait sprays. Their rapid action and high toxicity increase the probability that flies will consume a lethal dose before their appetite is satisfied and that they will die before they rid themselves of the toxicant.

The Entomology Research Branch of the United States Department of Agriculture has led the way in bait spray research. Various USDA investigations, such as the fruit fly investigations in Hawaii, have contributed considerably toward the development of new attractants and bait spray formulations. This research group is screening natural baits and attempting to synthesize new attractive compounds. A major portion of its work is aimed at finding more efficient attractants for fruit flies which have considerable economic impact, such as the Mediterranean and oriental fruit flies and the melon fly.

Oil of angelica seed, a new Mediterranean fruit fly attractant discovered by the Entomology Research Branch at its Hawaiian laboratory, is being used for survey purposes in the southern Florida Mediterranean fruit fly outbreak. It is an excellent example of the development of a powerful specific attractant for the purpose of detecting the presence of an insect at a low population level. This trap lure is not readily available in quantity and is quite costly. It was recently offered at prices as high as $250.00 per pound. This scarcity has led to considerable research and attempts to find other attractants readily available in quantity and economically acceptable.

Commercial research has been directed to the use of poison baits for the control of the housefly and other flies found around farms, garbage dumps, and slaughter houses. Procedures used in application of bait sprays or dry baits contribute toward the reduction of contamination of dairy products and reduce the likelihood of consumption of insecticides by farm animals. Both liquid and dry baits are available, and their use depends upon the preferred mode of application. Dry baits normally are mixtures of the insecticide and a dry carrier such as corn meal or sugar.

The use of natural products will continue to dominate the bait field due to availability and economy. Protein-hydrolyzate organic-phosphorus bait sprays as developed at the United States Department of Agriculture's Honolulu Laboratory (Steiner 1952, 1954, 1955) are a new advance in the use of attractants in insect control. The Hawaiian group found that heavy infestations of fruit flies were controlled effectively with protein-hydrolyzate type bait sprays at very low cost. Many such hydrolyzates are available. Among them, acid-hydrolyzed protein products and enzymatic yeast formulations are outstanding. The former products are substantially more economical. Acidic protein hydrolyzates are advantageous also because they are available commercially in large quantities, handle easily and remain stable under the most adverse storage conditions.

In the southern Florida Mediterranean fruit fly outbreak, the products extensively used most are produced by the acid hydrolysis of corn protein. It has been demonstrated in this large eradication program that this protein hydrolyzate is as effective as other more expensive protein hydrolyzate products. These products are Staley's Protein Insecticide Baits No. 2 and No. 7 (A. E. Staley Manufacturing Company, Decatur, Ill.).

	No. 2	No. 7
Total Solids	49.0%	49.0%
Amino Acids and Amino Acid Salts	31.2%	28.0%
Sodium Chloride	14.8%	8.3%
Ammonium Chloride	3.8%	2.9%
Weight per Gallon	10.3 lbs.	10.3
pH	5.2	4.7

These hydrolyzates are dark brown liquids containing 14 of the 22 known amino acids and have the proximate composition shown on page 34.

Working in Hawaii, Finney and Hagen (1953) of the University of California demonstrated that various amino acids were essential to egg production in the female fruit fly and suggested that an important male fruit fly fertility factor, possibly a vitamin, was present in an enzymatic soy hydrolyzate. These findings suggested that protein hydrolyzates might attract flies under field conditions. Steiner (1952) deduced that the nutritional requirements of fruit flies might be a clue to good field attraction and after preliminary field exposures gave proof of this. Steiner rapidly developed effective bait spray formulations using several different sources of enzymatic protein hydrolyzates with organic phosphate poisons. Steiner and associates subsequently found acid hydrolyzates that were as effective on an equal solids basis as the enzymatic types and determined that all attractive types were highly effective in promoting rapid attainment of sexual maturity and maximum egg deposition. These observations indicated that the nutritional requirements of insects prior to oviposition might well be considered in developing baits.

In Hawaii, protein hydrolyzates are being used for the control of the Mediterranean and oriental fruit flies and the melon fly (Steiner 1954-1955). Control is usually gained at a cost of 2 to 5 per cent of the crop value. A 25 per cent malathion wettable powder and the protein hydrolyzate (dry substance basis) may be used at a 1:2, 1:3, or 1:4 ratio. In actual formulation, one-half pound protein hydrolyzate solids and two pounds of 25 per cent wettable malathion powder in 5 to 150 gallons of water are usually applied per acre at weekly intervals. Complete coverage by the spray is not necessary because of the extreme attractiveness of the bait. However, good distribution improves performance.

Protein hydrolyzates have proved effective against the Mexican fruit fly (Shaw 1955) and were adopted in its earliest stages for use in the current eradication campaign along the California-Mexican border.

The walnut husk fly has long presented a problem in southern California walnut orchards and in 1954 was discovered in Sonoma County in northern California. Studies begun in 1955 and conducted by the University of California Citrus Experiment Station, Department of Entomology, Riverside, California, have demonstrated that Staley's Protein Insecticide Baits No. 2 and No. 7 are strongly attractive to the walnut husk fly, being superior in this respect to other protein hydrolyzates tried. Large scale trials of Staley's Protein Insecticide Baits No. 2 and No. 7 in bait sprays involving over 100 acres on six properties treated with aircraft, speed sprayer, and hand sprayers have produced very promising results in the control of walnut husk flies (Barnes).

Large scale application of bait sprays containing protein hydrolyzates is now in progress in the Florida Mediterranean fruit fly outbreak. From the time the Mediterranean fruit fly was found by a home owner on April 13, 1956 until the present time, large quantities of protein hydrolyzates have been utilized, principally the corn protein type. Since April 30, 1956, when the first area was sprayed, more than 750,000 acres have been sprayed with bait sprays. It is the usual practice to spray the same area six times; totaling in excess of 4½ million acre treatments. The Florida Mediterranean fruit fly eradication program approved formula for both single and multi-engine planes, as well as by ground equipment, is:

25% Malathion Wettable Powder
2 pounds

Protein Hydrolyzate 1¼-2½ lbs.
(1-2 pints)

Water Sufficient for a total volume of one gallon

This is sufficient to cover one acre.

This is the first instance of a large scale plane spraying for the Mediterranean fruit fly.

Since the arrival of the Mediterranean fruit fly in Florida, much concern is being given to the possible arrival of other unwanted pests such as the melon fly, the olive fly, the Mexican and oriental fruit flies. The possibility of such infestations being realized is much greater due to the steadily increasing volume of intercontinental travel and shipments. In addition, there are native insects such as the apple maggot fly and the cherry fruit fly which might be controlled by the use of bait sprays. Research is now in progress to determine if protein hydrolyzates will be effective as baits for these insects.★★

Use of Protein Hydrolyzates as Insect Attractants . . .

by N. R. Lockmillar and M. J. Thomas

A. E. Staley Manufacturing Co.
Decatur, Illinois

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Lindane

TEN years ago the commercial production of BHC in Germany began, followed approximately three years later by the production of pure Lindane. The story behind the introduction of BHC and Lindane is closely connected with Cela gmbh,, and in consequence we feel that we are appropriately placed to survey the development of Lindane right up to its present day position in Germany.

Spotlight on the Colorado Beetle

THE history of Lindane in Germany and indeed for the greater part of Europe, is in effect the story of the Colorado potato beetle. This pest first came to Europe in 1876, from America, but it was then swiftly eradicated. A similar fate attended beetles subsequently found in various parts of Europe. Following the first World War, however, a strong Colorado beetle infestation, covering 60,000 acres, was observed during the years 1920 to 1922 near Bordeaux (France). All measures introduced by the government in an effort to wipe out the beetle failed. The Colorado beetle spread from the "Invasion Beach-Head" at an increasing rate toward the North-East. It covered vast distances and literally chewed its way towards Germany, Switzerland, Belgium, Luxembourg, and the Netherlands, eventually reaching the Rhine in 1934/6. This menace, approaching from France, had been studied very carefully by Germany in close collaboration with the French Control Service and precautionary measures had already been taken. The "Colorado Beetle Defense Service" had been established and equipped with vehicles of all kinds, with spraying apparatus and insecticides, to meet the oncoming hordes, so to speak, at the frontier. Infiltration by the beetles began about 1936-1937 and the authorities endeavoured to control them effectively by all available means. This included the use of calcium arsenate, carbon disulphide, and the issuing of decrees compelling the public to assist in locating and destroying the pests. These measures launched against "Public Enemy No. 1" achieved varying success but they did at least succeed in limiting further encroachment. The summer of 1939 saw the lengthening shadows of World War II and when hostilities eventually commenced, the struggle against the beetle gradually ceased. As a result, the Colorado beetle was able to establish itself firmly in many parts of Germany and adjacent countries. The situation at the end of World War II is common knowledge and so also is the aftermath when intensive control compaigns were rendered very difficult.

The following figures show the degree of infestation in post-war Germany:

In 1947, 79% of all communities in Western Germany were infested with Colorado beetle. By 1949 this figure had increased to 83%, and in 1950 to 97%. In 1951 it had fallen slightly to 95%, whereas by 1952 it had risen again to 98%. In the potato growing areas of the south, 100% infestation was reported. In 1950, however, the infestation at the German/Danish border stood at only 62%. Germany was not alone in her affliction, however, and neighboring countries to the east suffered also.

The average infestation of a potato field resulted in a 20 to 30 per cent loss. Very often complete defoliation of the plants was observed. If in these cases infestation had taken place during the early spring, it resulted of course, in a complete loss of the crop. In addition to the losses in quantity, the starch content of the potatoes was reduced from 20.5% to 15%, which in practice means 1/5 of the nutritive value.

These proportions, serious though they are, can only be fully realized when considering the total figures of German production. The following appreciation will assist.

Germany is the largest potato producer in the world. In 1953 the total area under cultivation for this crop in Western Germany amounted to 2.8 million acres, the average yield per acre ranging between 800 and 3000 bushels. In that year, the combined production of Eastern and Western Germany was 1,360,000,000 bushels, whereas France produced 550,000,000 bushels and the USA only 380,000,000 bushels. Second to Germany was Poland, with 1,000,000,000 bushels (average of season 1948/49/50).

Why does Germany grow so many potatoes?

Potatoes are the staple food in Germany. Germans have potatoes with practically every meal. They are not considered merely as a vegetable, but are the main component of the meal. This was a very important factor during the difficult post-war years when food was scarce. In this connection it should not be overlooked that food rations during the years from 1945 to 1948 varied between 1,000 and 2,000 calories and on occasion even went below 1,000. The potato allocation was in fact the most important part of the food ration in the post-war period, and as a result it was a question of quantity rather than quality.

As fate would have it, the summer of 1947 in Europe was the driest and hottest in living memory. Hence, the potato crop would have been a poor one even without the Colorado beetle. But the outcome was that in the subsequent winter of 1947/48 the potato ration fell from 33 lbs. per person per month to 22 lbs. This meant that for every acre of crop destroyed by the beetle, sixty people lost their yearly potato ration. Due

in Germany

A Report From CELA G.m.b.H. Ingelheim (Rhein)

by W. Madel
and W. Biegel

to the Colorado beetle, the winter of 1947/48 became a winter of starvation.

The BHC Story

THE Colorado beetle created a critical situation in the post-war period, and this in turn gave a stimulus to the production of insecticides. In 1946, German manufacturers commenced production of BHC, though under great difficulties. Due to the general scarcity of paper and consequently paper bags, the production and distribution of dusts, etc., was severely handicapped. Even when limited supplies of bags were available, the products could be sold only on condition that the empty bags were returned. Laboriously, such difficulties were overcome and production gradually increased.

In the years immediately following the war, the largest proportion of the insecticides produced in Germany was used against the Colorado beetle. For example, in 1950 7,500 tons of wettable powder and emulsions respectively, as well as 3,400 tons of dust were used. Calcium arsenate preparations constituted a large percentage of these quantities. By comparison, in 1952 8,000 tons of wettable powder/emulsions and 5,300 tons of dust were used, and by this time organic insecticides predominated. An area of 2,250,000 acres was sprayed and about 600,000 acres were dusted.

To ensure a satisfactory control of the Colorado beetle, large quantities of insecticides were bought by the State Authorities through the intermediary of the German Crop Protection Service, who subsequently distributed the preparations to the farmers. Thus the situation, originating with an emergency, had a decisive influence on the introduction of BHC, and the subsequent development of this insecticide.

During these difficult times, it was only the quantity and not the quality of the potato which mattered. Potatoes of any flavor found an easy market, due to the fact that the population as a whole was more or less starving. This meant that there was virtually no restriction on the use of unpurified BHC as far as complaint from the consumers was concerned. Later on (shortly after the German currency reform) this question of taint resulting from the use of unpurified products was immediately discussed. From then on scientists and production engineers co-ordinated their efforts to produce the pure gamma isomer of BHC. It should be stated, however, that tainting was encountered only seldom, and was by no means general. Through successive stages of higher purification the 99/100% gamma BHC was finally reached in 1949/50. As the result of a suggestion from America by Dr. Rohwer, this product was sold under the name of Lindane.

Lindane

AT the annual German Crop Protection Conference in 1948, a well-known German expert submitted a paper entitled "Are There Tasteless and Odorless BHC Products?" This question was of importance because of the excellent insecticidal properties of BHC, and particularly because at that very moment the first substantial quantities of Lindane were being made available. The Federal Biological Institute for Agriculture and Forestry, together with the most important industrial enterprises, developed various methods of testing the purity of this insecticide. These constant checks brought about the production of quite outstanding grades of Lindane containing more than 99.5% gamma isomer. Today, the importance of Lindane in German crop protection is amply illustrated by the fact that 22 Lindane-suspensions, 27 emulsions and 32 Lindane-dusts are officially recognized as compared with 9 BHC-suspensions and 18 BHC dusts. In addition, there are 4 Lindane/DDT suspensions, 2 emulsions and 2 dusts available, formulated on this basis. Four different Lindane/Chlordane suspensions, 4 emulsions, and 4 Lindane/Chlordane dusts are officially approved and recommended. There are still more products based on a combination formula. In this category there are Lindane/Dieldrin, Lindane/Toxaphene, Lindane/DDT/

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A PROGRAM—to educate the farmer —to sell fertilizer

AT THE GEORGIA AGRICULTURAL EXTENSION SERVICE

by J. R. Johnson
extension agronomist

GEORGIA, especially so in its northern counties, is fast becoming an industrialized state. Factory payrolls, provided by newly arriving concerns, have helped to raise the general economic levels of the state and the Georgia Agricultural Extension Service has found most firms willing to aid in sponsoring extension service programs.

The Extension service began working closely with the fertilizer industry in the middle forties. Meetings were held throughout the state by extension agronomists in which county agents, fertilizer people, and college agronomists presented the latest research information on crops and fertilizers. These groups visited the experiment stations each two years and visited farms in the alternate years.

Prior to the start of the educational program, more than fifty fertilizer grades were recommended in Georgia. Today, eleven grades are on the recommended list.

The Georgia Plant Food Educational Society, an organization of the various segments of the fertilizer industry, was founded in 1950. Since that time the society has made remarkable progress in the training of leadership in the fertilizer industry. The society has worked closely with the College of Agriculture of the University of Georgia and has encouraged the manufacture and distribution of recommended grades of fertilizer.

Demonstration

Prior to this fertilizer movement in Georgia, 4-8-6 was the most common grade used by farmers.

Through a cooperative effort of the fertilizer industry and Extension Service, 4-12-12 was introduced and has been adopted by most farmers. This grade of fertilizer now constitutes the major portion of the fertilizer used in Georgia. In fact, all fertilizer recommendations are based on 4-12-12.

The Georgia Plant Food Educational Society and the Agricultural Extension Service have conducted a grazing system and feed production contest. This program has been instrumental in better grazing systems and feed production on Georgia farms. Not only does the Georgia Plant Food Educational Society pay for this contest, but fertilizer representatives in each Extension District work on the contest throughout the year.

The "on farm" judging is done by fertilizer representatives, as well as Extension workers and farmers. Annual award meetings are held each year.

The fertilizer industry furnished materials and funds for demonstrations on the use of various sources of nitrogen throughout the state. These demonstrations have proved to be a very effective educational method. As a result of this work, county agents in Georgia have established five demonstrations of nitrogen on Coastal Bermuda, thirteen demonstrations of nitrogen on corn and cotton, one hundred and three liquid nitrogen demonstrations on winter grazing and thirty-five nitrogen demonstrations on oats. On alfalfa, thirteen demonstrations with potash have been going for a year.

County agents use these demonstrations in tours, meetings, in short courses, and personal contacts. Such demonstrations provide an educa-

tional tool that is unexcelled in getting Extension agronomy work done. The fertilizer industry has been responsible for the employment of two Fertilizer Extension Specialists, who work with county agents and fertilizer people throughout the state and have a very effective educational program.

A series of Fertilizer Short Courses has been conducted by these specialists in the state. Those in attendance at these short courses were county agents, farmers, fertilizer manufacturers, salesmen and dealers.

These short courses proved to be very interesting and informative, with discussions centering on lime, nitrogen, What's in the Bag, as well as the economics of fertilization.

The National Plant Food Institute has furnished the means of expanding fertilizer education in Georgia. Farm success stories are written by extension agronomists and distributed to state newspapers by the National Plant Food Institute. These stories include fertilizer information worked into the story, so that a real teaching job can be done relative to

radio
newspapers
posters

fertilization. Newspapers are eager for these stories.

The National Plant Food Institute has also furnished posters that have been displayed throughout the state. In addition, the Institute has supplied soil sample tubes to each county agent in the state. These will undoubtedly be used to improve both the quality and quantity of soil samples now being taken.

An unusual joint program has been worked out between the Georgia Bankers Association, the National Plant Food Institute, and the Agricultural Extension Service. The Institute supplies advertising mats, free of charge, to the Georgia Bankers Association. The bankers' association, in turn, distributes them, on request, to member banks. The layouts for these advertisements are worked up jointly by the bankers' association, the Agricultural Extension Service, and the National Plant Food Institute.

Also supplied by the Institute are attractive folders promoting soil tests, and giving brief instructions on soil sampling. These folders are distributed by the Georgia Bankers Association to its members for use as envelope stuffers, to be sent out with bank statements, or as handouts at the various banks.

Plant food meters have been provided by the National Plant Food Institute to county agents in Georgia. These plant food meters give a quick reference to analysis of fertilizer materials so the county agent and the farmer can determine cost relationships of different materials.

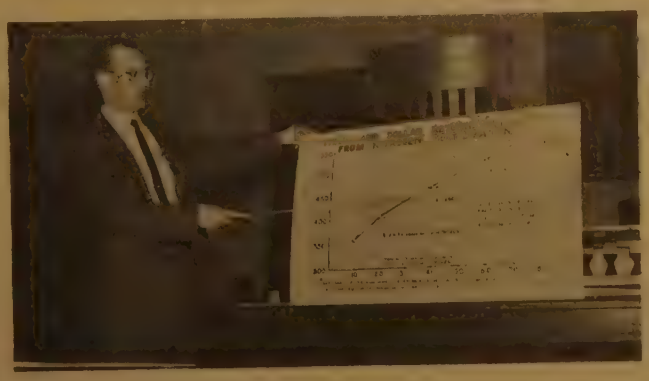
The Georgia Plant Food Educational Society has furnished fertilizer grade posters displaying the eleven recommended grades. The society has encouraged fertilizer manufacturers to manufacture recommended grades and to purchase Agricultural Extension Service circular, "Fertilizer Recommendations for Georgia." These publications are distributed to customers by the dealers.

The Georgia Society furnishes bags for taking soil samples as a means of promoting more efficient fertilization. The society encourages attendance at all fertilizer meetings in the state.

Since seed and fertilizer are the two most important items a farmer uses in making a crop, a series of Banker-Fertilizer-Seedsmen Meetings has been carried out over the state. The fertilizer specialists and the seed specialists present the latest information to these people. These meetings have been highly successful. They are supported by bankers and the seed and fertilizer industry.

More than 100 county-wide agronomy short courses on fertilizer, seed, cotton, pasture, corn, soybeans, and grain sorghum have been conducted over the state during the 1956-57 winter. The Georgia Plant Food Educational Society has been very helpful in notifying fertilizer people of these meetings. Some fertilizer manufacturers have sent their salesmen to these short courses so they will be well informed.

In order to produce high economical yields, efficient fertilization must be practiced. Georgia farmers have been growing row crops for generations and have a good knowledge of the fertilizer requirements for such crops as cotton and tobacco. In the shift to grazing crops, there is a big educational job to be done, not only with farmers, but with the fertilizer industry. The close cooperation among farmers, the Extension Service, fertilizer dealers and manufacturers is helping to promote better usage of fertilizer in the state.★★



Dr. Ralph L. Wehunt, extension agronomist—Soils and Fertilizer, relates nitrogen's role in increasing cotton income to fertilizer dealers at Georgia Short Course.

Short Course

illinois custom spray operators review pesticide application problems

ABOUT 600 custom spray operators, aerial applicators, farmers, and industrial representatives gathered on the University of Illinois campus at Urbana on January 24-25 for the 9th Custom Spray Operators School. Presenting the program were entomologists, agronomists and agricultural engineers from the Illinois College of Agriculture and the Illinois Natural History Survey, guest speakers from Kansas State College and Purdue University and commercial spray operators.

Timing Stressed in Borer Control

IN all sessions devoted to corn borer control, timing of insecticide treatments was stressed as the most important point of any successful corn borer control program. W. H. Luckmann, research entomologist for the Illinois Natural History Survey credited the high degree of control obtained by farmers in Illinois in 1956 to the general acceptance of the tassel ratio method (T.R.) of timing treatments.

In citing farmers' results in treating for borer control, H. B. Petty extension entomologist for the Illinois College of Agriculture, also reported best results when treatments were timed according to the tassel ratio method.

Control from 76.5 to 97.1 percent was obtained by 11 farmers who sprayed ¾ to 1½ pound of DDT per acre when T. R. values were between 25 and 55. Control averaged 90.6 percent in fields treated only with 1½ pounds of DDT when T. R. values were between 30 and 55.

DDT Granules or Sprays?

"GRANULES are not the 'wonder treatment' but they can be applied with much success," W. H. Luckmann reported. When granules and sprays are applied too early, they have about the same control. With properly timed treatments, granules gave somewhat better results than sprays. When granules were applied as the corn began to tassel, they were less effective than sprays applied at the same time.

The recommended rates for applying DDT granules in 1957 will be 12 pounds per acre of 5 percent clay granules with ground equipment and 20 pounds per acre with airplane application.

Although several different carriers for the granules were tested, Luckmann reported clays were the most common, and appear to be the best for corn borer control. A mixture of two or more different types of clay in the same formulation is not recommended.

For all practical purposes, farmers received the same degree of corn borer control in 1956 with properly applied amounts and correctly timed applications of either DDT granules or sprays, H. B. Petty reported.

In comparing seven fields sprayed with 1½ pounds of DDT, and nine fields where 12 to 20 pounds of 5% granules were applied at the correct time, the average control was 91 percent with the spray and 90 percent with granules. Further demonstrations of this type will be carried out where there is an opportunity, Petty said.

Progress in Corn Borer Control

DURING four years from 1947 through 1950 and in 1956 eighty-three farmers agreed to leave a portion of their fields untreated to compare with the treated area. In 1947, average corn borer control obtained through insecticide treatment was 52 percent. In 1956, the average control including fields where treatments were incorrectly timed, was 81 percent. Each year showed some increase over the year before.

In looking over this record of progress, Mr. Petty explained that farmers have become better acquainted with the corn borer and its damage, and do not become excited and treat too early. Correct timing is believed to be responsible for the increased control obtained.

If treatments are timed correctly and used on fields that need treatment, using insecticides to control corn borers is a profitable practice.

Pesticide Residue Situation

G. C. Decker, head of economic entomology for the Illinois Natural History Survey, emphasized the responsibility of all manufacturers, formulators, dealers, applicators, and farmers in making sure that food and feed products remain free from objectionable residues. He pointed out that under the Miller Bill no pesticide residues are permitted on any raw agricultural product except by official tolerances or exemptions.

Residues on forage crops are one of the problems yet to be solved, Dr. Decker pointed out. But he expressed hope that tolerances for several pesticides in the fat of animals or meat will be forthcoming at an early date.

The Spotted Alfalfa Aphid Problem

PRESENTING the school with first hand experience and knowledge about the spotted alfalfa aphid was C. C. Burkhardt, entomologist from Kansas State College. He explained that the aphid damages alfalfa

by killing the lower leaves, and sometimes the entire plant. The plant is defoliated. Yield is reduced, and hay quality is low because of stemminess. The aphid also covers the plant with a type of honey dew in which a black fungus often grows, discoloring the hay and further reducing its quality.

Mr. Burkhardt reported the spotted alfalfa aphid is easy to kill with insecticides. But it is hard to prevent rapid reappearance because of the aphid's rapid spread by flight and its high reproductive rate. If any untreated areas are left in a field, they act as a source of rapid reinfestation. Coordinated spraying of large areas at one time provides a more complete check on the aphid and retards reinfestation.

Parathion at 4 ounces (usually 1 pint) per acre, and malathion at 10 to 15 ounces (1 pint usually contains 10 ounces) per acre have been found to be the most effective insecticides now available. However, parathion is not recommended for farmer use because of the extreme danger of poison to the operator. Mr. Burkhardt urged commercial applicators to follow great caution if they use parathion.

Malathion is less poisonous. The higher rate is recommended when temperatures are below 60 degrees F. or when foliage is dense and rank.

If alfalfa is approaching cutting height, it may be advisable to cut instead of spraying, Burkhardt pointed out.

Temperatures have been an important factor in successful chemical control of the spotted alfalfa aphid. When below 50 degrees F., good control has been obtained with ground equipment pressure of 80 to 110 pounds per square inch. Some high pressure rigs got excellent control with 120 to 200 pounds pressure. But when temperatures are higher, lower pressures had to be used to avoid loss of material by vaporization, Mr. Burkhardt reported.

Values of Insect Control

TREATMENT of insect pests in field crops gave Illinois farmers a profit of $7 million above cost of treatment in 1956, H. B. Petty reported. Surveys made in all counties of the state showed about 1.4 million acres were treated to control corn borers, grasshoppers, chinchbugs, cutworm, soil insects, pea aphids, sweet clover weevils, spotted alfalfa aphids, leafhoppers, and spittle bugs.

The largest number of acres — about 665,000 was treated for corn borers and the estimated profit was $3.9 million. Next highest was for soil insects with 370,000 acres and an estimated profit of $1.6 million.

About half of all acreage was treated by individual farmers. About one-fourth was treated by commercial ground applicators and the other fourth by airplane.

Latest Weed Control Findings

IN controlling Canada thistle, 2,4,-D may be looked upon as a control material to check growth and prevent seeding, stated O. C. Lee, associate professor of botany at Purdue University. But complete control or eradication is seldom obtained.

(*Continued on Page* 121)

J. Garland, right, of Dixon, new president of the Illinois Ground Sprayers Association, and A. E. Pickard, of Mt. Vernon, who was re-elected secretary-treasurer.

1. (L to r) C. C. Burkhardt; Lillard Hedden, Pekin, secty.-treasurer of the Aerial Assoc.; Robert Danforth, Monmouth, president of Illinois Aerial Applicators Assoc.; and Charles Knote, Cape Girardeau, Mo.
2. H. B. Petty, University of Illinois, chairman of the Sprayers School, emphasizes the importance of timing insecticide application to (l to r) farm adviser, A. C. Kamm, Monticello; Herbert Stam, Watseka sprayer; Glen Wilken, Monticello farmer; and L. A. Hodam, representative for a Bement bank.
3. Lillard Heddon, Pekin, center, secretary of the Illinois Aerial Applicator's Association, talks with Les Gilbert, (left) vice-president, and Robert Danforth, president, on the right.
4. W. Luckmann of the Illinois Natural History Survey discusses the tassel ratio method of timing corn borer treatments with (right to left), Ross Allmon, (seated), Hercules Powder Co., M. H. Lebeck, Harvel farmer, Dick Both, Hercules Powder, and Phil Leonard, American Cyanamid.
5. Wendell Bowers, center, discusses spray equipment problems with Earl Peterson (left) Hillsboro Farm Adviser, and Fred Osterber (right) Royal Ground Sprayer.
6. A speakers get-together. (l to r) F. W. Slife, W. O. Scott, O. C. Lee, and Earl Spurrier.

CALSPRAY

IF Horatio Alger had written about corporations instead of personalities, the story of California Spray-Chemical Corporation might well be attributed to him. The Calspray story began in 1907 with two men, an entomologist and a chemist, working in what was little more than a shed in Watsonville, California.

Now, Calspray, a subsidiary of the Standard Oil Company of California, has become the world's largest company specializing in the manufacture of agricultural chemicals, with four major manufacturing plants in the United States and one in France, 46 dust mills and liquid formulating plants in the U. S., Canada, Mexico and Puerto Rico, 82 district and branch offices here and abroad, and distribution of "Ortho" products round the world.

It goes without saying that the company has made important contributions to the industry to achieve such eminence in a highly competitive field, and a review of these contributions on the occasion of Calspray's 50th anniversary should provide an enlightening picture of the past and future of the agricultural pesticide industry.

The contributions accredited to Calspray research chemists and entomologists are well known. The highly refined petroleum oil sprays developed by W. H. Volck, one of Calspray's founders, are still in use today. These dormant and phytonomic oil sprays were the first materials to give effective control of Black and Red scale on citrus and San Jose scale on apple and pear trees without harming foliage. They were also effective in killing the eggs of the codling moth and red spider.

Volck and his co-workers were also responsible for two improved arsenicals, as well as for several important advances in emulsifying agents. They developed an effective fungicide (calcium copper silicate), and formulated improved spreading, wetting and sticking agents. They developed the "Vapo-Dust" or fog spray system of applying insecticides and fungicides.

With the coming of the organics, Calspray developed lindane and, later, TEPP, the first of the phosphates to be made available for commercial use. A recent important contribution is captan, one of the most versatile and effective fungicides on the market today.

Less well known than these product formulations are the contributions of Calspray's Engineering Division. Vice-President P. S. Williams, in charge of engineering at Calspray since 1940 and formerly chemical engineer with Standard Oil Company of California, reviews the highlights of Calspray's engineering progress as follows:

"Let's start with improvements in products that were responsible for putting Calspray in business. Arsenate of lead was the backbone of the insecticide industry for more than thirty years, and Calspray originally manufactured it by the method of combining arsenic acid and litharge directly which Calspray's founders, W. H. Volck and E. E. Luther, had patented. At the height of lead arsenate usage, Calspray's engineering department developed a method and built a plant for making litharge directly from metallic lead by a unique continuous system of oxidizing the lead. The resulting product, very different from ordinary heavy soggy litharge, was a light powder, highly reactive chemically, which lent itself particularly well to reaction with arsenic acid in the formation of lead arsenates.

"The resultant economics and flexibility of the new process were an important assistance to lead arsenate supply during the shortages of the war years. The process was made available to at least one other manufacturer of litharge who abandoned their conventional leadburning plant in favor of the more economical process which fed pig lead in one end and brought out finished

Photos Facing Page:
Plant food manufacturing plant adjoining Calspray's pesticide manufacturing plant in Richmond, California.
Micro Mill for pulverizing waxy materials such as DDT, BHC and DDD is an invention of Calspray Engineering.
Photos below:
Some 46 dust plants have been installed in Calspray warehouses throughout the country, and in Canada, Mexico and Puerto Rico, to allow formulation of many combinations of basic chemicals "on location."
Kilns for drying lead arsenate and Bordeaux Mixture at California Spray-Chemical Corporation's first plant in Watsonville, California, circa 1910.
Calspray's litharge plant produces 20,000 pounds per day.
Until recently, anhydrous ammonia was packaged in small cylinders requiring expensive handling. Today the equivalent of many hundreds of these cylinders are conveyed by truck in a single vessel.

in 50th YEAR

By Owen R. Thorpe
Manager Information Service
California Spray-Chemical Corp.
Richmond, Calif.

litharge continuously as a fluffy powder.

"Calspray's developments and engineering contributions have been responsible for many improvements in insecticide manufacturing which very literally helped to establish the acceptance of chemical pest control by making materials available to the farmer at a price he could easily justify by obvious results. The scope of the industry's problems, however, quickly expanded beyond primary manufacturing processes and plants. With markets everywhere that agriculture existed, progress in distribution and service became of great importance. Wide acceptance and consequent rapid growth in the use of agricultural chemicals demanded a more closely integrated supply situation.

"With increasing knowledge about farm pests, their habits and habitats, and with the rapid development of many formulations and combinations, it became apparent that pesticides should be available to the farmer on short notice and in a form which would suit his particular immediate demand. He needed drug store service to keep his crops healthy.

"There were a great many formulations required for scientific pest control in the field, varying rather widely in strength and in the number of active ingredients involved, but the technical materials which were used to make the finished formula were relatively few. Calspray recognized that central manufacturing of the technical materials and the preparation of concentrates of technical materials was economical, because these concentrated materials could be shipped long distances without an unreasonable freight burden. On the other hand, *service to the field with finished formulations would be most efficient and economical only at a point local to the point of consumption.*

"To satisfy this pattern, Calspray's engineering developed their Portable Dust Plant which comprised a compact unit accepting concentrates either in solid or in liquid form and incorporating them into the multitude of formulations necessary to satisfy the requirements of the local farmer as needed—and at a high production rate where infestations demanded or seasonal application peaked-up.

"Installed in Calspray's warehouses, the unit was compact and left a maximum amount of space for stocking of the technicals from which the prescriptions could be made up. Fillers, which constitute the great bulk of finished insecticide dusts are normally quickly available locally. Calspray has installed some 46 of these field units in various consuming areas, making it possible to give the farmer efficient service in the minimum time and over a wide range of effective formulations.

"Operation of local branch formulating plants quickly became a successful pattern which has been generally adopted by the industry, with resultant improved service to the farmer. In some localities, particularly those where multiple truck crops are major, the diversification of formulations required is staggering. In certain areas in California and Florida, an insecticide plant may be called upon to produce as many as twenty different formulae each shift. Naturally, these must be produced without contamination, as the divergence may be so great that ingredients incompatible in mixture, or hazardous when contaminated from one crop to another, go through the process.

"To avoid possible contamination without slowing the process, Calspray designed a special type of dust mill to serve these localities. The batch is prepared in a polished elevator container, or "Skip," while the previous batch is being processed through blending, incorporated by grinding through a mill, and packaged. An accurate scale under the skip allows the batch to be made up in a minimum amount of time. Immediately after the previous batch has been discharged into packages, all of the specially designed equipment frees itself of residue by gravity. The skip then is hoisted rapidly aloft and by a unique rail arrangement turned upside down into the empty blending equipment, the polished skip dumping completely free and dropping back to the floor to receive the next formulation.

"When DDT introduced the potent organics to agriculture, the industry was faced wtih the new problem of pulverizing these waxy materials to the extraordinarily fine particle size required for economical application. High pressure air impingement processes being developed required heavy machinery, difficult to get in the early post-war years without long delivery delays, and entailed slow installation.

"Calspray Engineering designed and constructed their 'Micro Mill' to meet agriculture's demand for high quality DDT products. The machine was economical of power and employed no high pressure air compressors or other heavy long-delivery equipment. These units were installed at Calspray's manufacturing plants and still exist as their major source of finely pulverized air-classified wettable powders containing DDT, BHC, DDD and other materials impossible to condition adequately in conventional mills.

Future Trends

"Decentralization of final formulation, so effectively serving the field from Calspray's Portable Dust Plants, is spreading from dusts to applications involving plant food and insecticide liquids, granular insecticides and agricultural chemical formulations made in field plants directly from the technicals. Supported by large scale continuous production units in strategically located central manufacturing plants, the system will provide the nimble and economical supply required to serve the kaleidoscope of agricultural demand.

"Only by engineering an integrated production system taking advantage of local labor and material supplies can a real attempt be made to maintain the increasing burdens of cost of rehandling, freight and intermediate packaging. To this extent, the effect of spiralling costs on

(*Continued on Page* 125)

National Agricultural Chemicals Association

Holding Meeting at San Francisco, March 6

CREDIT and investments, as they are related to the agricultural chemical industry's future are the main topics of consideration at the spring meeting of the National Agricultural Chemicals Association being held March 6-8 at the Fairmont Hotel, San Francisco, California. Fred W. Hatch, NAC president, and manager of the Agricultural Chemicals Division, Shell Chemical Corp., will take a sharp and realistic look at the Industry's future in his presidental address. Comments and views on what constitutes a proper return on investments in the agricultural chemicals industry will be offered by F. C. Shanaman, president of the Pennsylvania Salt Manufacturing Co. of Washington, while a credit specialist, J. A. Walker, Standard Oil Company of California, will report on the contributions of a sound credit program to agricultural progress.

Continuing the discussion of credit, finance and progress, Earl Coke, vice president of the Bank of America, is scheduled to report to NAC members on a banker's interest in financing farmers' pest control programs. Still another phase of development is manpower, and this topic is scheduled for consideration by Dr. S. B. Freeborn, provost, University of California, who will report on the present and probable future supply of technically-trained manpower.

F. Hatch, NAC president and J. V. Vernon, vice president.

With the growing season fully underway, NAC members will find particular interest in the USDA report on the label review program which will be offered by John T. Coyne, Plant Pest Control Branch, ARS, USDA. A graphic report on industry problems and what the NAC is doing to help solve them will be presented by Mr. L. S. Hitchner, NAC executive secretary and NAC staff members.

Other prominent speakers on the 3-day program include A. F. Kirkpatrick, American Cyanamid Co.; C. O. Barnard, executive secretary, Western Agricultural Chemicals Association; and J. V. Vernon, Food Machinery and Chemical Corp.

National Agricultural Chemicals Association Program

Fairmont Hotel, San Francisco, California

Tuesday — March 5

2:00 P.M.
Board of Directors Meeting

Wednesday — March 6
Mr. F. W. Hatch, NAC President, Presiding

9:30 A.M.
Welcome
Mr. A. F. Kirkpatrick, general program co-chairman, Nitrogen and Allied Products Division, American Cyanamid Co., Oakland, California
Remarks
Mr. C. O. Barnard, executive secretary, Western Agricultural Chemicals Association, San Jose, California

9:45 A.M.
Presidential Address
Mr. F. W. Hatch, NAC president, manager, Agricultural Chemicals Division, Shell Chemical Corporation, New York, New York

10:15 A.M.
Men for Agricultural Progress
Dr. S. B. Freeborn, provost, University of California, Davis, California

10:45 A.M.
Money for Agricultural Progress
Mr. Earl Coke, vice-president, Bank of America, San Francisco, California

11:15 A.M.
Credit for Agricultural Progress
Mr. J. A. Walker, general credit manager, Standard Oil Company of California, San Francisco, California

6:00 P.M.
Reception for Members and Guests

Thursday — March 7
Committee Meetings as Scheduled

Friday — March 8
Mr. J. V. Vernon, NAC Vice-President, Presiding

9:30 A.M.
Remarks
Mr. J. V. Vernon, President, Niagara Chemical Division, Food Machinery & Chemical Corporation, Middleport, New York

9:45 A.M.
Outlook for Return on Investment in the Agricultural Chemicals Industry
Mr. F. C. Shanaman, president, Pennsylvania Salt Manufacturing Company of Washington, Tacoma, Washington

10:15 A.M.
Making Federal Legislation Work
Mr. J. T. Coyne, Assistant Head, Pesticide Regulation Section, Plant Pest Control Branch, A. R. S., United States Department of Agriculture, Washington, D. C.
Question and Answer Period

11:15 A.M.
The Growing Market in Forest Pest Control

11:45 A.M.
How NAC Serves the Industry
Mr. L. S. Hitchner, NAC Executive Secretary and NAC Staff Members

SOME 130 Industry research and sales personnel, along with interested representatives of state and federal research agencies attended the fourth annual Pacific Northwest Agricultural Chemicals Industry Conference, held at the Benson Hotel, Portland, Oregon, January 23, 24, 25, 1957. Sponsor of the meeting was the Western Agricultural Chemicals Association.

Onion Maggots

"In Walla Walla, Washington the growers are in the 'thick' of the maggot problem," panel moderator Wayne Stambaugh, county extension agent from Walla Walla, stated in a review of onion maggots. "Growers normally plant in the fall so that sets may be harvested for spring planting in other areas of the Northwest. In 1956 they used a malathion topdressing which was applied at 5-day intervals in open fields. DDT was not used, as all onion fields there have had high rates of DDT applied in prior years for wireworm control."

"Onions have been cultivated in the Northwest for some 50 years," commented D. G. Finlayson, entomologist, Dominion Entomological Laboratory, Kamloops, B.C. "After its effectiveness for maggot control had been found in the east, calomel was used in the Northwest until 1948, when high maggot populations in treated fields were encountered. By 1950 researchers had switched to DDT as a seed-treatment, with considerable success. By 1953 extensive populations of flies in western Oregon were reported after DDT was used. When furrow drenches of the same chemical were applied with formaldehyde, high populations continued. Failures of DDT were reported also at that time in western Washington. Eastern Oregon and western Idaho also experienced high fly populations," Finlayson concluded.

Because of this irregular response, individuals in the various areas working on this problem decided to work out an "international" experiment where each researcher would present his best candidate pesticide and method of application for control. Malathion, heptachlor, isodrin and dieldrin were applied in 1955 as seed and furrow treatments. Isodrin gave fairly good results by the fall of 1955; malathion worked well in western Oregon and Washington, and east of the mountains the chlorinated materials performed well. In the 1956 experiments, dieldrin, heptachlor, malathion and endrin were used as seed treatments using ½ and 1 oz. of actual per pound of seed; and as furrow treatments with the seed at rates of 1 and 2 pounds of toxicant per acre. The aim of this experiment was to protect bulb onions for the entire growing season. During the period of April to September, endrin was the only material which showed promise, and it left much to be desired.

Don Scott of the Parma, Idaho, branch Experiment Station reported on a survey of onion varieties being tested at the station in connection with their breeding program. His observations indicated that there may be several varieties which could have some resistance to onion maggot. He also reported on a Diazinon, sugar, and water bait which was applied to onion plants. 90% control of adult flies in 24 hours was shown by means of tanglefoot traps used as checks on the treatment. As onion maggot flies normally undergo a 6 to 10 day period between emergence and egg laying, this method may have some control value.

1958 Industry Conference Chairman, George Coffman. Diamond Black Leaf, Portland, Oregon.

What will be recommended for onion growers in 1957? In British Columbia DDT is still very effective, but heptachlor or dieldrin at ½ oz. technical per pound of seed, used in the form of a 50% wettable powder will be suggested. No fungicide is needed with this combination in that area. DDT is not used currently, as 8 oz. per pound of seed is required, and the lower rates of the other two materials make it easier for growers to plant in the usual manner. Washington growers will be using malathion, and in Idaho growers will have a furrow application of aldrin, heptachlor or dieldrin suggested; this to be followed by a surface application when the onions emerge, with supplemental applications at 7 to 10 day intervals. Oregon growers will have a malathion seed treatment suggested for use on green bunching onions, with later applications of a 10% DDT dust, which should protect them till harvest. Malathion as a seed treatment presents no residue problem, but germination is cut down if a fungicide such as thiram is not used. While endrin seed treatments are most promising, they can't be recommend-

William I. Ziegler, American Cyanamid retiring industry conference chairman; William Furtick, Oregon State College.

E. L. Gooden, USDA, ERB, Beltsville, Md. and E. A. Madison, E. S. Gandrud Co.; Owatonna, Minn.

C. Coffman Chairman of Pacific N. W. Agricultural Chemicals Industry Conf.

ed yet, due to incomplete residue data.

Legume Seed Pests

"Legume seed crops grossed Oregon farmers some 35 and a half million dollars last year, according to USDA figures," E. A. Dickason, OSC entomologist, stated. "Such legumes as alfalfa, red alsike, white dutch and ladino clovers form an important part of Oregon's agriculture with a good future. Use of chemicals for legume insect pest control has been made possible by complex agricultural changes and the specialty seed industry. While a small percentage of growers utilize chemicals fully for insect control, a much larger number could benefit from these practices," Mr. Dickason commented. "Injury is often difficult to detect, especially from those insects which attack blossoms or developing seeds. The problem of residues limits pesticide recommendations. On seed crops, the grower initially may not be too concerned with residues, but he may suddenly by choice or necessity be forced to

Dr. Paul O. Ritcher, Oregon State College and Dr. Rene Blondeau, Shell Development Corp., Denver, Colo.

by Charles Starker

cut his crop for hay or pasture it, if no seed is produced—at which time residues immediately become of the utmost importance.

"Pollinating insects are essential in legume seed production, and their welfare must be considered in planning control programs. Thus materials non-toxic to pollinators must be used when they are working the fields, or else more toxic pesticides should be applied at a time when workers are not in the field."

Extension Is Your Business, Too

Extension is "off campus" adult education, said R. W. Every, OSC extension entomologist, reporting that results of Experiment Station experimental work are carried to the people by individual contact, county agents, demonstration meetings, radio, TV, news bulletins, etc. Experiment station research men attend commodity meetings, participate in radio programs, offer information for news stories, and write bulletins. At the local level the County Agent is the backbone of the Experiment Station program, and the local representative—adapting recommendations to local conditions, where the program receives the "acid test."

Industry uses similar media for product promotion — developing interest through advertising, radio, TV, and meetings—thus taking research results to the people. Industry cooperates with extension by furnishing material for demonstrations; product information on hazards and toxicity of materials; loans movies, and furnishes leaflets, many of which can be used directly by county agents. It also contributes to youth programs, such as the 4-H Entomology Program. Last year 452 youngsters in Oregon were in 4-H Entomology projects, and sent 101 Entomology exhibits to the state fair.

Some 6 million families in America were assisted in agricultural problems by their county agents in 1955. Requests for assistance included questions on farm crops, fertilizers, new crops, and insect control. During the growing season last year, more than 25% of the requests for help from Oregon county agents dealt with insect control; during the non-growing season 15% of the requests were on the same topic. One county agent said 75% of his requests during the growing season were for help in insect control.

"Poor communications between research, extension and industry are obstacles to extension. Workers can over-extend themselves without adequate research data to back up statements. This may happen with either industry or extension. Neither agency is in a position to gamble. All agencies—extension, college research, and industry are inter-related, and this connection is becoming stronger because of common problems such as pesticide tolerances. On this subject there is a definite need for 'grass-roots' thinking in setting up requests for tolerances, so they will be realistic and tie in with current farming practices," Mr. Every concluded.

Granular Insecticides

"Granular pesticides are a relatively new and increasingly popular physical type of control material. They have demonstrated definite advantages in specialized instances in control of mosquitoes, sand flies, white fringed beetle, European corn borer, chinch bug, ants, wire worms, cutworms, and Mediterranean fruit fly," stated E. L. Gooden, ERB, ARS, USDA, Beltsville, Md. "Standardization of product is still a problem, and direct control in production is needed, as well as evaluation of dustiness,

(*Continued on Page* 119)

new source of high quality lime
...quicklime and hydrate
West End, supplier of quality chemicals for over 31 years, proudly announces expansion of its hydrate and quicklime production. Discovery of an extensive deposit of high grade limerock resulted in the construction of a large new processing plant. The photo shown here is of the giant 340 foot rotary kiln. The plant will soon be producing increased quantities of highest quality lime to serve the needs of growing western industry. We suggest you give consideration to West End as a primary source of supply. Inquiries and your specifications are invited.
WEST END
West End Chemical Company
DIVISION OF STAUFFER CHEMICAL COMPANY
EXECUTIVE OFFICES, 1956 WEBSTER, OAKLAND 12, CALIF. • PLANT, WESTEND, CALIF.
SODA ASH • BORAX • SODIUM SULFATE • SALT CAKE • HYDRATED LIME

Consumption of Commercial Fertilizers and Primary Plant Nutrients in U. S. to June 30, '56

By W. Scholl, E. I. Fox, H. M. Wallace and F. Crammatte

Fertilizer and Agricultural Lime Section
Soil and Water Conservation Research Branch
Agricultural Research Service
U. S. Department of Agriculture
Beltsville, Maryland

THE estimated consumption of commercial fertilizers in the United States and Territories (Hawaii and Puerto Rico) during the year ended June 30, 1956, was 22,096,000 short tons (Table 1). This was a decrease of 2.8 percent (628,000 tons) from the quantity used in 1954-55. Consumption of mixed fertilizers amounted to 14,749,000 tons— a decrease of 3.9 percent (599,000 tons)—and of materials for direct application 7,347,000 tons—a decrease of 0.4 percent (29,000 tons). Included in the materials for direct application is 6,568,000 tons of products containing one or more of the primary plant nutrients (N, available P_2O_5, K_2O) and 779,000 tons of secondary and trace nutrient materials. The tonnage of secondary and trace nutrient materials, of which approximately 85 percent was consumed in the Pacific region, was practically the same as that in 1954-55.

There was a decrease in the total fertilizer consumption in seven of the nine regions of the continental United States and in the Territories. Slight gains occurred in the West South Central and Pacific regions. Approximately 79 per cent of the decrease in total fertilizer consumption occurred in the Middle Atlantic, South Atlantic and West North Central regions where nearly 45 per cent of the tonnage of all fertilizers was used. These three regions accounted also for most of the respective decreases in mixed fertilizers and materials.

Among the individual areas, the East North Central region showed the largest decrease in mixed fertilizers (152,000 tons), but this was offset largely by the increase in use of materials (132,000 tons). In only the Mountain and Pacific regions was there an increase in the use of mixed fertilizers. However, the mixtures used in these two regions comprised less than 15 per cent of the tonnage of all fertilizers used therein and less than 3 per cent of the total consumption of mixtures in the United States. The consumption of fertilizer materials for direct application showed increases in only three regions—East North Central (13.3%), West South Central (1.1%), and Pacific (0.5%).

Of the various classes of materials used for direct application, an increase in consumption was shown only by the phosphate products (Table 2). Among such products the greatest increase (nearly 55%) was in phosphate rock, chiefly in the East

(*Continued on Page* 125)

Table 1. — Estimated Fertilizer Consumption in United States, Year Ended June 30, 1956, with Comparisons

Region	Consumption[1] Mixtures	Materials[2]	Total	Change from 1954-55 Mixtures	Materials	Total
	1,000 tons	1,000 tons	1,000 tons	Percent	Percent	Percent
New England[3]	353	70	423	— 3.4	— 6.4	—3.9
Middle Atlantic[4]	1,175	205	1,980	— 6.5	—11.0	—7.0
South Atlantic[5]	4,787	1,090	5,877	— 2.9	— 5.4	—3.3
East North Central[6]	3,369	1,128	4,497	— 4.3	+13.3	—0.4
West North Central[7]	1,177	865	2,042	— 8.4	— 3.9	—6.5
East South Central[8]	1,972	914	2,886	— 2.0	— 1.0	—1.7
West South Central[9]	701	666	1,367	— 1.0	+ 1.1	+[11]
Mountain[10]	52	342	394	+ 0.4	— 8.5	—7.4
Pacific[11]	314	1.917	2,231	+ 5.6	+ 0.5	+1.2
Continental U. S.	14,500	7,197	21,697	— 3.8	— 0.2	—2.6
Territories[12]	249	150	399	—10.8	— 6.2	—9.1
Total: 1955-56	14,749	[13] 7.347	22,096	— 3.9	— 0.4	—2.8
1954-55	15,348	[13] 7,375	22,723	0.0	0.0	0.0
1953-54	15,541	[13] 7,232	22,773	+ 1.3	— 1.9	+0.2

[1] Includes fertilizers distributed by Government Agencies. [2] Includes: Ground phosphate rock and colloidal phosphate, basic slag, secondary and trace element materials, such as borax, metallic salts, sulfur, gypsum, etc., used as separate materials. Does not include liming materials or the quantity of materials used for manufacture of commercial mixtures. [3] Maine, N. H., Vt., Mass., R. I., Conn. [4] N. Y., N. J., Pa., Del., D. C., Md., W. Va. [5] Va., N. C., S. C., Ga., Fla. [6] Ohio, Ind., Mich., Ill., Wis. [7] Minn., Iowa, Mo., N. D., S. D., Neb., Kan. [8] Ky., Tenn., Ala., Miss. [9] Ark., Okla., La., Tex. [10] Mont., Idaho, Wyo., Colo., N. Mex., Ariz., Utah, Nev. [11] Wash., Oregon, Calif. [12] Hawaii, P. R. [13] Materials not guaranteed to contain N. P_2O_5, or K_2O included in 1955-56 total, 779,000 tons; 780,308 tons in 1954-55; 615,513 tons in 1953-54. [14] Less than 0.05 percent.

Table 2. — Estimated Consumption of Classes of Materials for Direct Application in the United States and Territories, Year Ended June 30, 1956 with Comparisons

Class	Year Ended June 30, 1955	1956	Change from 1954-55
	1,000 tons	1,000 tons	Percent
Chemical nitrogen materials	3,500	3,262	— 6.8
Natural organics	461	444	— 3.6
Phosphates	2,233	2,469	+10.6
Potash materials	401	393	— 2.1
Secondary and trace nutrient materials	780	779	— 0.2
Total	7,375	7,347	— 0.4

Table 3. — Estimated Consumption of Kinds of Chemical Nitrogen Products for Direct Application in the United States and Territories, Year Ended June 30, 1956, with Comparisons

Product	Year Ended June 30 1955	1956	Change from 1954-55
	1,000 tons	1,000 tons	Percent
Ammonia, anhydrous	356	431	+21.8
Ammonia, aqua	232	302	+30.2
Ammonium nitrate	1,115	930	—16.6
Ammonium nitrate—Limestone mixtures	358	301	—14.3
Ammonium sulfate	520	411	—20.9
Calcium cyanamide	69	65	— 5.3
Calcium nitrate	56	61	+ 8.8
Nitrogen solutions	109	108	— 0.6
Sodium nitrate	616	547	—11.2
Urea	68	92	+33.4
Other	3	8	——
Total	3,500	3,262	— 6.8

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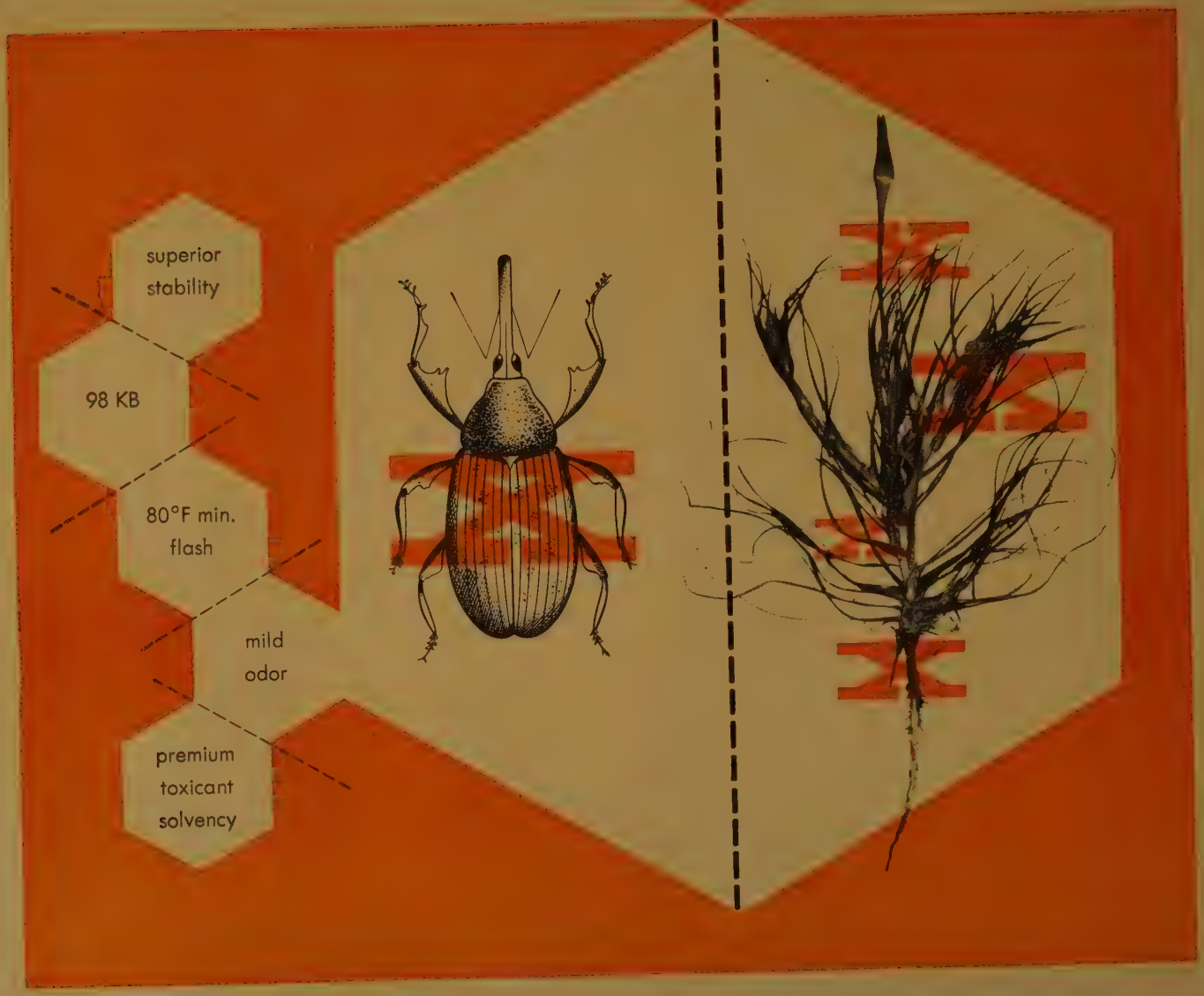

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AGRICULTURAL CHEMICALS

A Survey Reporting . . .

What the American Farmer will BUY in 1957

AMERICAN farmers will buy one million more tons of fertilizer in 1957 than they did in 1956, according to a nationwide survey conducted by the Doane Agricultural Service, Inc., through its Countrywide Farm Panels, representing a cross-section of the nation's 2,100,000 full-time farm families.

Farmers plan to buy 4.7 per cent more fertilizer this year than they did last year. A similar survey sent to these same panel members last year showed that fertilizer sales would be down 4.5 per cent from 1955. Latest U.S.D.A. figures on fertilizer consumption show that the actual decline from July 1st, 1955 through June 30, 1956 was down 4.41 per cent. Other private estimates place the decrease for the calendar year 1956 at approximately 3 per cent.

This survey also showed that 1.5 million farmers will use some type of agricultural chemicals in 1957. Seventy-nine per cent of the panel members plan to use chemicals in 1957—a one per cent increase over last year.

The Doane Countrywide Farm Panel is the nation's largest agricultural survey organization, containing a balanced cross-section of the nation's 2,100,000 full-time farm families having a gross annual farm income of $2,500 or more, and producing 87 per cent of all farm products sold.

The questionnaires asking farmers to show their plans to purchase fertilizer and agricultural chemicals, as compared with last year, were mailed out January 28th. As of this date, the number of usable returns is 1,556 or 79%.

On a regional basis, the survey shows that the greatest increase in the use of fertilizer will be in the South Central Region, followed by the East North Central and the North Atlantic Region; a decrease is expected to occur in the West North Central and Western Regions.

Plans to purchase fertilizer in 1957 as compared with 1956 are shown in table 1.

The decline in potential fertilizer purchases in the West North Central and Western Regions reflects a combination of drought conditions last year resulting in carry-over of fertilizer, as well as the effects of acreage control and the Soil Bank program.

Table I	Percent Change
North Atlantic Region	+ 7.9
South Atlantic "	+ 3.8
South Central "	+14.7
East North Central Region	+ 8.9
West North Central "	— 4.3
Western	— 9.8
United States	+ 4.7

Eighty-five percent of all panel members plan to buy one or more types of fertilizer in 1957. The types are as follows:

Type of Fertilizer	Plan to Use in 1957	Increase—1957 over 1956
	Percent	Percent
Complete mixed fertilizer		
Dry type	77	1
Liquid	5	14
Nitrogen Fertilizers		
Anhydrous Ammonia	13	8
Liquid Nitrogen Solutions	4	28
Ammonium Nitrate	31	2
Other Nitrogen Fertilizers	8	Same

While approximately 1.5 million farmers are expected to use some type of agricultural chemicals in 1957, the survey shows that many farmers will use only one or two types.

Chemicals for controlling insects on livestock will be the type most frequently used, according to the survey. Fifty-five per cent indicated they planned to use them in 1957; forty-two per cent indicated they planned to use post-emergence type weed sprays this year.

Thirty-six per cent more of the farmers plan to use pre-emergence weed sprays and twenty-five per cent more plan to use brush killers in 1957 as compared with last year.

The per cent of farmers planning to use various types of chemicals in 1957, and the per cent increase in users for each is shown at bottom.

A wide variation in the intended use of pre-emergence weed sprays was reported — ranging from a high of thirty-one per cent in the North Atlantic Region to a low of five per cent in the South Central Region. Increase in number of users was greatest in the East North Central Region.

(Continued on Page 136)

Type of chemical	Percent Planning to Use in 1957	% Increase 1957 over 1956
	Percent	Percent
Pre-emergence weed sprays	13	36
Post-emergence " "	42	7
Brush killer " "	21	25
Insect Control on Crops	41	3
Insect Control on Livestock	55	Same

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CALCIUM ARSENATE— PENCO Pencal—low-lime calcium arsenate for blending with organic insecticide bases.

PENTACHLOROPHENOL— PENCO Pentachlorophenol Technical—in flake form (oiled or unoiled) for processing into liquid concentrates or finished sprays.

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ENDRIN— PENCO Endrin D-25—25% dust base for extending to field strength dusts.

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Pennsalt Chemicals

WASHINGTON REPORT

By Donald Lerch

HOW good is your farm intelligence system? The way things are stacking up, the winner of this year's agricultural sales battle may well be the company with the best on-the-farm intelligence system that gets accurate information on planting intentions back to the home office in a jiffy. Washington's continued juggling of acreage programs has a good many farmers befuddled—the chances are farmers won't know until the day before, just what and how much they are going to plant.

Washington's handling of the corn problem is a prime example. Differing Senate and House bills plus conflicting testimony by Secretary Benson have all combined time and again to delay decisive action on corn planting programs. And, even at this late date, there still is a lot of confusion about how existing plans will work out for the individual farmer.

Fertilizer companies, burdened with the job of moving bulk tonnage in many cases, might do well to keep their plans fluid as the drills and planters get oiled up for this season's work. Pesticide manufacturers also may well experience shifts in demand because of last minute decisions by farmers.

While the full impact of the Soil Bank Program on acreage reduction is yet to be tallied, records of other acreage reduction programs of this decade show that little real reduction in total farm production has resulted from government pleas.

For instance, in the two years immediately before the Soil Bank, the 8% reduction in the total production of the four basic allotment crops—cotton, wheat, corn, and rice—was more than offset by increases in the production of other crops. The government officially admits that acreage allotments, coupled with price supports, have not been effective in controlling the acreage of corn, particularly where corn is fed to livestock or sold over the back fence to neighbors. While most producers of cotton, wheat, and rice comply to some extent with acreage allotments and marketing quotas, only 40% of the farmers in the commercial corn area followed the corn allotments.

Furthermore, farmers turned around and did a better job of farming on land they did put into allotment crops.

Here's the record of increases in yield during the years immediately before the Soil Bank: wheat yields up 15%; cotton yields up 28%; rice yields increased by 16%.

Furthermore, the total planted acreage of all crops decreased only 1% during this same period, and relatively little land was shifted from harvested crops to pasture, simply because farmers don't want to make the rather large capital investment required for this move.

Best information shows that higher yields, in cotton for instance, were due to better weather, use of more fertilizer and pesticides, and the concentration of smaller acreage of cotton on better land.

This is why we can liken agricultural production to a balloon—squeeze it on the left side and it bulges out on the right.

Most of the land diverted from the basic crops went into these seven other crops—oats, barley, sorghums, soybeans, flaxseed, rye, and hay. Thus it remains to see whether the government's drive to reduce corn production this year will enjoy any real success.

The record shows that the farmer is as much a businessman as any executive running a corporation, and that he'll go to almost any length to cushion a drop in income. Maybe this is one compelling reason why the same percentage of farm wives have gone to work at jobs as their city cousins—no one takes a cut without a struggle.

Washington is wondering whether the Food & Drug Administration will be successful in bringing out its own chemical additive food bill. Several bills already have been introduced in the Congress, including the new offerings by Congressman O'Hara (R-Minn.) and Congressman Delaney (D-N. Y.).

The National Agricultural Chemicals Association tried to get pesticides completely out of chemical food additive bill legislation during the last session of Congress. It can be expected that the Association will make the same move this year when the time is appropriate.

However, the Food & Drug Administration itself is very much aware of the chemical food additive problem, and it is understood that the Agency has drafted its own bill.

Washington strategy dictates that an agency get a favorite bill included in part of the "Administration package." If this can be accomplished, it's generally considered that the measure has a much better opportunity of passing, particularly when there's likely to be opposition to it from key voter groups. Before such administration approval is given, it's usually customary for the draft of the bill to be circulated among key government departments for reaction. Assuming all government departments approve the

(*Continued on Page* 135)

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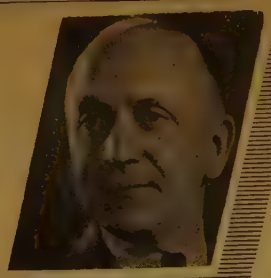
Fertilizer Views and News



By Vincent Sauchelli

More About Water-Solubility of Phosphates

LAST month this column commented on water-solubility of phosphates. My attention has been directed to work on this subject by Mr. T. P. Hignett of the T.V.A.

"Water soluble P_2O_5" as used by the A.O.A.C. refers to the percentage of the available P_2O_5 content that is soluble in water as determined by its procedure: A 1-gram sample is placed on a filter paper and washed with successive small portions of water until 250 milliliters of filtrate are collected in one hour's time. This washing removes the readily soluble phosphorus compounds from superphosphate such as ammonium phosphates and monocalcium phosphate. Ordinarily the control laboratory does not determine the actual amount of phosphorus dissolved by the washing procedure since this is not required by law in the United States. The guarantee is for "available P_2O_5" which comprises water-soluble plus citrate-soluble and the procedure just described is to prepare the washed phosphate for extraction with neutral ammonium citrate solution.

If some states shall require in the future that the "water-soluble P_2O_5" content be guaranteed as is the case in the United Kingdom, the current A.O.A.C. method may need careful study to determine its adequacy for use in evaluating this quality of a commercial fertilizer.

The investigations made at the T.V.A. laboratories and reported by Hignett show that the relative cost of producing fertilizers having a higher degree of water-soluble P_2O_5 will be higher than under conventional formulating practices. This cost may be relatively small based on selling prices but could decrease producer's profit by a large percentage. Unless the trade recognizes these facts and is willing to pay more for a guaranteed amount of water-solubility, the manufacturer has no inducement to furnish products of a high solubility.

Mr. Hignett illustrated his comments with different formulations. His study shows that the maximal practical degree of ammoniation of a normal superphosphate in commercial processing is between 6 and 7 pounds of free ammonia per unit of P_2O_5 and this reduces the water solubility of the P_2O_5 by about 20 to 25 percent. In the case of a triple superphosphate the maximum is 2.5 to 3.8 pounds of free ammonia per unit of P_2O_5 which reduces the water solubility by about 40 percent.

The production of higher analyses of the same ratio in which solutions are used to ammoniate the triple super may be one means of getting higher water-solubility of P_2O_5 at relatively lower costs than in the lower analyses using normal superphosphate.

Water in plant physiology

FARMERS everywhere cannot ignore the role of water in the production of crops. At present, this indispensable factor in the success of farming is getting top billing in the farm press and in farmer meetings. Irrigation is no longer confined to the arid regions of the country; it is being applied increasingly to commercial crops throughout the land. One of the fundamental considerations concerns the know-how of utilizing efficiently what water is available. This has demanded a better "know-how" of water use. Some new ideas of this "why" phase are noted in what follows.

Water transpires from plants through the evaporation of liquid water inside the stomata of the leaves (these are the tiny "mouths" or openings on the underside of leaves). This water vapor diffuses through these openings into the air. The rate of transpiration depends on three factors: the energy absorbed by the leaf, which causes the water to vaporize in the stomata; the rate of vapor diffusion into the atmosphere, which depends on the difference of vapor pressures inside and outside the stomata; and the rate at which this vapor mixes with the body of the atmosphere, which depends on the windiness or turbulence of the air surrounding the leaf. On a hot, dry day the air causes a big vapor pressure difference; moist cool air, a low difference. We all know that a windy day is a better drying day than a still one. Hot winds speed up evaporation, while still, humid days don't help it at all.

Physics teaches that to evaporate one gram of water requires 600 calories of heat. Plant leaves absorb solar energy and use a part of it to evaporate water in the stomata; use only ½% in photosynthesis and reradiate most of the energy into the atmosphere as long heat waves. The amount lost in the form of re-radiated heat increases as the leaf gets hotter and the air gets clearer and drier. Moist air and clouds absorb these long heat waves, and in turn

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Plant physiologists now believe that the mechanism plants use to get rid of unwanted, absorbed energy is through the transpiration of water as mentioned previously. This is what makes the leaves of a live plant exposed to a hot sun cooler than the surface of a bare dry soil—the transpiring plant is utilizing and getting rid of unwanted energy; while the hot, dry earth will heat the air in contact with it. It has been estimated that crops growing throughout the year, such as pastures, lose through transpiration about 18 to 20 inches of water, and this loss in equatorial swamps will be as high as 5 to 6 feet. In New England and similar regions about two-thirds of the annual loss of this kind would occur during the four summer months, May to September.

Another point is this: the amount of water utilized by a growing crop does not depend upon how much growth it is making: a starved crop uses as much as a well-fertilized one, provided it is covering the ground completely and remains green, according to research done at Rothamsted, England: On a permanent hay field the unfertilized plot gave only 600 lbs. per acre, while the fertilized one gave 5600 lbs. of forage per acre, both plots receiving the same amount of rain, namely 3 inches in the previous 3 months, and the grass taking about the same amount of water from the soil, 3 to 4 inches, respectively. A well-fertilized crop will use more water and make a higher yield because its roots go down into the subsoil deeper and use water at such depths, while the unfertilized crop has a limited root system which is unable to tap the water supply at the lower depth.

The amount of water available to a crop that a soil can hold cannot be increased appreciably. How then, can a crop extract more water from the soil? The most important way it seems is not to try to increase the soil's water holding capacity, but rather to increase the depth of the crop's root system or, in a heavy, compact soil, increase the power with which the root system can punch its way through the clay. This means applying the proper fertilizer in suitable quantities to stimulate growth and a powerful root system coupled with appropriate soil management practices.

News for future scientists

MOST students of personnel problems involving future scientists are agreed that our country's No. 1 problem is the threatened shortage of trained personnel. During the past two decades research has caused vast evolutionary changes in all phases of agriculture. The remarkable improvements in the technology of fertilizer manufacture; the enormous growth of the industry supplying agricultural chemicals to the farm; the advances in powered mechanical equipment;—these are examples of the changes created by research. The emphasis on more research to meet the future needs of America, and in fact, world agriculture, and the demand for research on the part of industry and of government agencies and universities are high-lighting the numerous opportunities which lie ahead for students in the agricultural sciences.

Are these opportunities attracting young men and women to our educational centers to prepare themselves for them? Apparently, they are not. Enrollments in schools of agriculture throughout the nation at the beginning of the current school year showed a sharp decline as compared with other schools. This is a distressing fact. Why are agricultural college enrollments shrinking, when the opportunities for research and employment in the several fields of agriculture are expanding? There certainly is something wrong, somewhere. Is the general exodus from farms to urban centers creating a feeling among the young that agriculture has no future? Perhaps the competition of other industries for the bright young college graduates is too powerful: the big salary appeals, the pension plans and other forms of security held out by the scouts for other branches of industry are lures hard to overcome.

Surely, there are many youths to whom the lure of the outdoors, of the growing of crops and animals, and the love of nature is still potent, but who may not realize that despite the decline in the number of farmers, there is an increasing need for persons trained in the agricultural sciences. Modern agriculture has created an expanding demand for agronomists, botanists, microbiologists, veterinarians and a host of other specialists. Modern agriculture like other industries requires scientists of high professional attainments and the opportunities it offers for good pay and advancement are as good as in most other industries.

Now is the time for leaders of all agricultural groups to pool their efforts directed to acquainting the youth of our country with the attractive opportunities in the agricultural sciences and industries. If our agriculture and its allied service industries are to sustain and continue their splendid progress, it will be necessary to send the right kind of raw material to our agricultural colleges and schools for training under expert guidance. We should all try to encourage gifted youth to enter the fields of agriculture and research. The agriculture of tomorrow will be no better than the character, skill, and calibre of its leaders of tomorrow.★★

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D-O To Expand Production

Dorr-Oliver, Inc., Stamford, Conn., has announced plans for major expansion and re-allocation of its United States production facilities, and a further expansion of Dorr-Oliver-Long, Ltd.'s plant at Orillia, Ontario. Both programs are designed to increase overall production capacity and to reduce manufacturing costs as well.

The program for Dorr-Oliver involves centralization of all domestic filter manufacturing at the Hazleton, Pa., plant.

The D-O-L plan for the Orillia, Ontario plant is an extension of an expansion program begun early in 1956 and is scheduled for completion this year.

LISTENING POST

By Paul Miller

This department, which reviews current plant disease and insect control problems, is a regular monthly feature of AGRICULTURAL CHEMICALS. The comments on current plant disease problems are based on observations submitted by collaborators of the Plant Disease Epidemics and Identification Section, Horticultural Crops Research Branch, United States Department of Agriculture, Beltsville, Maryland.

Control of Gray Mold on Strawberries

E. M. Stoddard and P. M. Miller,* of the Connecticut Agricultural Experiment Station, write that gray mold caused by the fungus *Botrytis cinera* is always a serious disease of strawberries in years when rainy weather or conditions favoring heavy dews occur between bloom and harvest. In the field, the causal fungus does not readily infect the ripe fruit, but attacks more particularly the pedicels of the flower buds and the stems and the calyces of the small green fruit. Besides causing severe damage, infection of these parts of the plant builds up a reservoir of inoculum which in rainy weather will infect the ripening crop with a massive spore load impossible to control effectively with sprays during harvest.

Control Under Greenhouse Conditions: Experiments were designed to test the effectiveness of the several materials at the stage of plant development when maximum damage occurs in the field and under optimum conditions for development of the causal fungus.

The materials tested were Thioneb (polyethylene thiuram sulfide), Mesulfane (N-methane-sulfon-N-trichloromethano-mercapto-4-chloranilide), Norsulfane (N-methano-sulfon-N-trichloromethano-merpacto-anilide), Puratized 1180 (a non-metallic thiocarbamate derivative), ziram, nabam, dichlone, captan, and thiram.

(*Continued on Page* 120)

*Stoddard, E. M., and P. M. Miller. Control of gray mold on strawberries under greenhouse conditions. Plant Disease Reporter 40 (5) :443-445.

Table 1.
Fungicidal control of gray mold on strawberries in greenhouse tests, Connecticut.

Treatment	Pounds per 100 gal.	Total no. berries	Percent control after 10 days	Percent control after 18 days
		Experiment 1[a]		
Thioneb	3	43	77	70
Thiram	3	40	75	68
Mesulfane	3	66	80	52
Norsulfane	3	63	67	51
Puratized 1180	3	53	55	21
Captan	6	64	50	44
Ziram	3	51	49	39
Nabam	3	62	24	13
Control		51	12	4
		Experiment 2[b]		
Thioneb	3	38	82	69
	1½	42	43	31
	¾	36	58	25
Thiram	3	46	82	81
	1½	67	84	72
	¾	23	84	52
Mesulfane	3	34	91	70
	1½	40	82	50
	¾	27	89	43
Norsulfane	3	30	90	70
Norsulfane	1½	42	81	50
	¾	28	68	43
Captan	6	40	65	37
Dichlone	¾	28	86	82
Control		37	35	21

[a]Four replicates.
[b]Three replicates.

Table 2.
Control by fungicides of grey mold of strawberries in field tests.

Fungicide and concentration (lbs./100 gal.)[a]	Infected berries on indicated date of count: June 27 Number[b]	June 27 Percent as compared with control plots	July 3 Number	July 3 Percent as compared with control plots
Captan (6 lbs.)	372	71	526	65
Thylate (3 lbs.)	167	31	219	27
Phygon (⅜ lb.)	145	28	261	32
Unsprayed control	528	100	812	100
L S D 5 percent=16			28	

[a]Fungicides were applied on May 18, June 4 and June 14. First application was made just at start of bloom.
[b]Total number of infected berries from 15 five-foot sections, 5 from each of 3 replicates.

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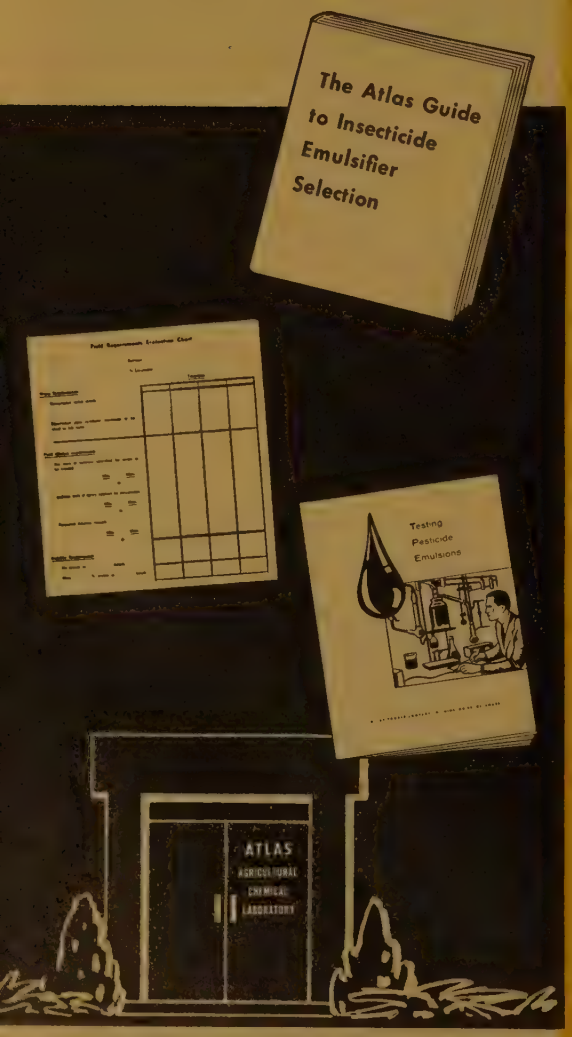

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This column, reviewing current insect control programs, is a regular feature of AGRICULTURAL CHEMICALS. Mr. Dorward is head — Plant Pest Survey Section, Plant Pest Control Branch, U. S. Department of Agriculture. His observations are based on latest reports from collaborators in the U.S.D.A.'s pest surveys throughout the U. S.

By Kelvin Dorward

Corn Borer Population Lower

The number of European corn borers in hibernation this winter is lower than last year according to a survey conducted by State agricultural agencies in 27 of the more important corn States this past fall. Counts dropped from 147 per 100 stalks in 1955 to 105 in 1956. In the North Central States the decrease was from 173 borers per 100 stalks to 98. In some of these States less than half as many borers were recorded as last year. Illinois dropped from an average of 285 in 1955 to 127 in 1956. Indiana decreased from 172 to 97. Iowa continued to drop from 497 in 1954 to 351 in 1955 to 220 in 1956. Persistent drought conditions have contributed toward the continued decline in corn borer populations in this area.

In contrast with the declining numbers in the North Central area, all of the 13 Eastern States surveyed, except Maryland and New Hampshire, showed increases over last year. The borer average in this group of States rose from 75 per 100 stalks to 130. The overall decrease in the corn borer population does not necessarily mean a corresponding decrease in the amount of damage which may be anticipated from this serious pest during the 1957 crop year. The severity of the winter, and weather conditions next spring and summer, will have an important bearing on development of infestations during 1957.

Heaviest concentrations of borers were found on Long Island, N. Y., in Rhode Island, New Jersey, southeast Pennsylvania, and eastern and central Iowa. Long Island's Suffolk County reported 1089 borers per hundred stalks of corn, which was the highest population of any county reporting. Perhaps in connection with the high population in that county was the unusual occurrence of the pest there in potato tubers. The light general infestation lasted but a short time, but during the period all Long Island potatoes moving for export were fumigated with methyl bromide. The borer also atacked potatoes in some eastern North Carolina area, causing severe damage, but as far as known this injury was confined to the potato plants.

This introduced insect, which was first found in the U. S. near Boston, Mass., in 1917, was not found in any new states this past year; however, it was found in 37 new counties within 4 of the 37 infested states. New county records were as follows: Mississippi 28, Arkansas 7, Alabama 1 and South Dakota 1.

Livestock Pests Active

Cattle grub surveys in Arkansas show larger numbers per animal than in January 1956; 2.2 compared with 8.4. Counts in Oklahoma average about 4 per animal in some areas. Averages in Ellis and Riley Counties, Kansas, ranged from 1.8 to 2.7 Of cattle inspected in Palm Beach County, Fla., in early January, 95 were infested with an average of 11 grubs. Sheep scab mite was reported in sheep in some flocks in Virginia and Iowa. The affected animals were dipped in all cases. Cattle lice have been serious in several areas of Utah, with more than 5000 head of cattle treated in Millard County of this state. The cattle tail louse has become a serious pest of cattle in Wilkinson County, Miss.

Other Insect Conditions

The Fall alfalfa egg survey in New Jersey showed 72 percent of alfalfa fields in the state have infestations, compared with 42 in fall of 1955. Average number of egg clusters is more than 2 per 100 stems. Based on these findings, it appears that all alfalfa acreage in the state may need to be treated for the pest in 1957. Egg surveys in New Jersey for another pest, the meadow spittlebug, indicate that infestations are expected to be low in legumes this coming season. Small grain pests have not been reported in unusual numbers this winter. In early February a survey in 20 central Texas counties showed the winter grain mite as generally light over the area. Light infestations of this mite, brown wheat mite and army cutworm have been reported from some Oklahoma counties. Two-spotted spider mites were requiring control on strawberries in lower Rio Grande Valley of Texas. Cole crops were heavily damaged in some Georgia and South Carolina counties by the vegetable weevil.

Status of Alfalfa Aphid

Spotted alfalfa aphid continued its rapid spread across the United States in 1956. This destructive pest, which was found in New Mexico in the spring of 1954, reached the Mississippi River by the end of 1955 and in early 1956 it was collected in northern Florida. As of January 1, 1957, the aphid was known in 30 states. In answer to a recent questionnaire, most of the more-heavily infested states indicated that wind was the primary agent of spread within their areas. Mild weather conditions during late fall and early spring and overlapping of alfalfa crops in some of the southern areas were among other factors listed as contributing to spread and development of infestations.

Cost of alfalfa production in the states hardest hit by the pest has increased considerably. It has been estimated that additional costs amount to as much as $7.50 per ton of hay in treated areas, depending on number of treatments required and percentage of crop lost. Cost estimates by states were as follows: New Mexico $.75-4.50, Utah 1.50-2.00, Nevada 2.00, Oklahoma 7.50, Arizona 2.50, Arkansas 2.00-2.50. Missouri showed estimates of $1.50-1.75 per ton for increased costs from spotted alfalfa

(*Continued on Page 115*)

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TECHNICAL SECTION

Comparison of Indiana Sampler, Slotted Single Tube and Riffle

By C. W. Schneider and M. D. Sanders
Swift & Co.—Plant Food Div.

As part of a general program of sampling mixed plant food shipments, some study was devoted to attempting to determine the relative effectiveness of several simple sampling devices that might be used for bagged goods.

4-80 lb. bags at equal intervals from shipments of 5 to 10 tons ea. (100 to 200 bags)
Grades sampled were 3-12-12, 4-16-16, 5-20-20, 10-10-10, 12-12-12, 0-20-20.
Products were semi-granulated; individual bags were sampled as follows:
Odd numbered bags were sampled, lying flat, twice, by probing opposite diagonals with a ¾" single tube slotted tryer inserted upside down and turned right side up before withdrawal. Each probe was handled as a separate sample.
Even numbered bags were similarly sampled in duplicate with a double tube, ¾" "Indiana Sampler."
After probing, each bag was split on a large riffle, each original half being split down to approximately 1-qt. size, providing duplicate samples from each riffled bag.
All samples so taken were ground to pass 20 mesh through a Mikro Sample Mill, quartered by riffling to 4 oz. and analyzed without replication.

Differences between duplicates with the same sampling device were computed and the standard deviations of these differences (s_d) were calculated. (The difference is always the first sample minus the second).

Application of the "F" test revealed that the only standard deviation significantly greater than the others by 95% odds or better was that of the single tube probe for potash.

Average Difference — Tubes vs. Riffle

To determine whether the average differences ($\bar{d}$) between sampling devices were signficant, averages of duplicates with a trier were compared with corresponding averages of riffle duplicates on the same bag with the "t" test.

	P_2O_5	K_2O
Single tube—riffle	$\bar{d}$=+.16	+.15
Double tube—riffle	+.10	+.18

(Values for nitrogen were obviously insignificantly different).

Two of the above values (+.16 and +.18) were significant at 95% or better odds. However, these average differences are not really of considerable magnitude.

The confidence limits dependent on a minimum of ten bags between the various instruments, were calculated according to accepted procedure with the following results provided values from 10 or more bags were averaged for each device.

N & P_2O_5	Max. Diff.	Odds
Either trier vs. riffle	.5%	90%
	.25%	70%
K_2O		
Single tube vs. double tube or riffle	.75%	90%
	.4%	70%

This means, for example, that we would not expect differences averaged from 10 or more bags greater than .5% between either trier and riffle for N & P_2O_5 90% of the time. In one of ten such comparisons such a value might be exceeded.

n = Number of Samples
Values of Standard Deviations (S_d)

	N		P_2O_5		K_2O	
Single tube	.144	n = 14	.220	n = 16	.360	n = 16
Double tube	.151	n = 14	.221	n = 16	.210	n = 16
Riffle	.196	n = 28	.159	n = 32	.139	n = 32

Conclusions

1. Application of the "F" test reveals that the only standard deviation of differences between duplicates significantly greater than the others by 95% or better odds was that of the single tube probe for potash.
2. The average difference between the average of duplicates with one device and that with another device was significant in only two cases, and the magnitude for these was not great.
3. The maximum difference 90% of the time expected between the average analysis of 10 or more bags with one device and that with another device would be less than 0.5% for N & P_2O_5 and less than .75% for K_2O 9 times out of 10.
4. This study casts some doubt on the precision of the single slotted tube, but did not, of course, take into consideration different sized tubes or fertilizer other than that having a wide size range.

Economics of Automatic Sampling

By P. E. Cook
Denver Equipment Co.

TODAY practically all progressive companies recognize the importance of quality control, and have some type laboratory testing facilities.

Yet, regardless of the investment in buildings, equipment or technical personnel, the results of their testing can be no more accurate than the samples on which their tests are based.

If there is ever going to be the remotest connection between sampling, testing and economics, there must be a method of obtaining an accurate sample from which test results can be projected.

It is absolutely impossible to manually sample material in motion with any consistent degree of accuracy. Individual sampling techniques vary from day to day. Regardless of personnel training or standardized procedure, the sampling technique will vary from one individual to another. I want to emphasize, it is absolutely impossible to manually sample with any consistent degree of accuracy or reliability. The answer to this problem of "economics" in sampling is a mechanical sampler that will do what it is told to do, when it is told to do it and will do it in exactly the same way each and every time.

The purpose of sampling is of course to secure a small amount of material representative of the entire larger amount. Material which is not in motion is difficult to sample with any predictable accuracy.

Material in motion offers an ideal condition for sampling. A continuous cutting motion across a moving stream would result in a sample increment similar to the diagram. Deviations from quality would appear in the sample in the proportional degree they were present in the main stream.

In order to secure such a sample the cutter would be in continuous motion and the sample would normally be too large for testing purposes without secondary sampling.

In manual sampling the human element tends to meet volume requirements, yet lacks consistent accuracy, both in cutter travel, speed and manner of sampling. Mechanical sampling follows the set procedure regardless of existing conditions and results can be depended upon as having the sample taken exactly in the same manner at each cut.

Now, disregarding the factor of reliability, what is the cost factor? Is there an economic advantage to automatic sampling over manual sampling?

Let us assume the quality control engineer wants a sample taken each 5 minutes. To do so would require a man's full attention. But

*Based on report presented at the Fertilizer Industry Round Table, Washington, D. C., October, 1957.

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he cannot spare a man full time and modifies his decision to sample each 30 minutes. This means an operator must stop what he is doing, take the sample, dispose of the sample, then resume his work. For illustration, we will estimate a sampling cycle as 10 minutes or 20 minutes for the two samples per hour. That is 20 minutes each hour to stop work twice, take the two samples, dispose of same, and get back on the job.

As an individual item manual sampling does not seem large—16½¢ per sample if you can get a man at the minimum wage. But even at this rate it amounts to $660 per shift per year or nearly $2000 per year for 3 shift operation.

Now compare this cost with an automatic sampler. Using a cost of $600 for the sampler and $600 for installation we have a cost of $1200. Amortized over 5 years, the cost per year is only $240 for full time operation. On the basis of 2 samples per hour, each sample cut mechanically would cost 2¢ as compared with 16½¢ for manual sampling.

Location of the sampling unit, the amount of sample and the frequency of the sampling cut must come from the quality control engineer.

A fertilizer plant flowsheet is given in the Industrial and Engineering Chemistry plant process series. The solid raw materials are Potash, Normal Super Phosphate, Triple Super Phosphate, inerts and recycle material.

Possible location for automatic samplers in a fertilizer plant might include one on the raw materials before they are put in storage bins. Another sampler might be between the ammoniator and the dryer. A third sampler could be placed ahead of the bagging department.

In a flaked ammonium nitrate plant it is possible that a sampler might be desired ahead of the cooling belt, one on the screen oversize material and one on the material going into the bagging hopper. If coating agents are supplied to specifications, it might be desirable to have a sampler ahead of the batching scale.

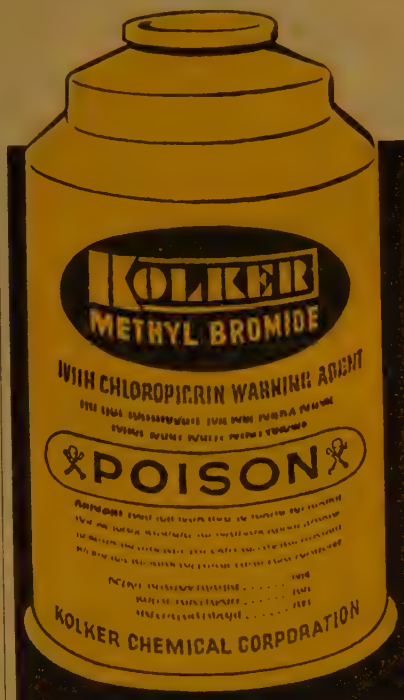
Agreement between producer and customer on how the material is to be sampled in determining whether or not it meets specifications is important.★★

NC, ESA Meeting March 27

The 12th annual meeting of the North Central Branch, Entomological Society of America will be held at the Hotel Savery, Des Moines, Iowa, March 27 through 29. Highlights of the conference include the following invitational addresses at the opening general session: "What is that Larva?" by Alvah Peterson; "Systemic Insecticides for the Control of Livestock Pests," by R. C. Bushland; "Evolution of Insect Flight," by L. E. Chadwick.

Other features include a panel discussion of the Spotted Alfalfa Aphid and a program on residues.

Section meetings will cover forest insects, livestock insects, cereal and forage crop insects, systematics, fruit and truck crop insects, physiology and toxicology.



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Volume 2 For Manufacturers of Mixed Fertilizers Number 3

DOES HE BUY ALL HIS FERTILIZER FROM YOU?

Complete Fertilizer Service Builds Exclusive Customers

Every fertilizer manufacturer wants plenty of exclusive customers. One way to build customer loyalty is to study trends and be a step ahead by anticipating and supplying your customers' total plant food needs.

Two important trends are evident in 1955-56 fertilizer consumption figures: **1)** The growth of the use of high-nitrogen fertilizers during a year when total mixed fertilizers remained stable. **2)** The fact that more nitrogen is sold as straight materials than in mixed fertilizers.

Mixed fertilizers used in 1955-56 contained 815,000 tons of nitrogen, while straight materials accounted for 1,137,000 tons. This is in contrast with 1,789,000 tons of phosphoric acid and 1,671,000 tons of potash in mixed goods versus 457,000 tons of phosphoric acid and 218,000 tons of potash as straight materials.

Get More of the Market

The longer our soils are farmed, the greater the need for nitrogen along with phosphorus and potash. Experiment Stations are recommending better-balanced fertilizers. Corn and several other major crops require more nitrogen than any other plant food.

You get a bigger share of the fertilizer market when you are prepared to provide all of the mixed-goods analyses and straight materials your customers want.

When farmers buy low-nitrogen mixed fertilizer, more and more of them are supplementing this with direct-application nitrogen materials. Sell straight nitrogen materials along with your mixed goods and you build your volume as well as your leadership among farmers as a dependable, one-stop source of supply. Few farmers can get the crop profits they want by using straight nitrogen alone, any more than they can by using low-nitrogen fertilizers alone.

Nitrogen Division is prepared to assist you in enabling you to offer your customers a complete line. Many different ARCADIAN Nitrogen Solutions are available for the manufacture of every fertilizer analysis now in demand. Nitrogen Division is also the only source of all kinds of straight nitrogen materials, both solid and liquid, for direct application.

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CORN IS A BIG TONNAGE MARKET FOR FERTILIZER

For the U.S. as a whole, more fertilizer is used on corn than on the next four crops combined. The use of fertilizer on corn has been increasing at a rapid rate. 60% of all corn planted was fertilized in 1954, as compared to 48% in 1948. Corn that was fertilized got 38 pounds of fertilizer per acre in 1938...103 pounds per acre in 1948...and 259 pounds per acre in 1954.

Despite acreage limitations, the market for corn fertilizer is a big opportunity. Nearly 40% of the crop still gets no fertilizer. Almost half the crop gets no fertilizer at planting...less than one-third gets plow-down fertilizer...and the side-dressing market is mostly undeveloped except in the Southeast.

An All-State Market

Corn is a fertilizer market in every state. New hybrids have extended the growth of corn further north and south and at higher and lower altitudes. Even California, which grew little corn a few years ago, keeps expanding its acreage. The only crops which compare with corn as a fertilizer market, in limited areas, are cotton, wheat, oats, tobacco, fruits and vegetables, potatoes, rice, barley and sugar beets. But, corn is the universal market.

Figure Your Potential

If 5,000 acres of corn are grown within a 5-mile radius of the average fertilizer dealer and farmers are using the average amount of fertilizer per acre, he can sell his share of the 388-ton market. And he has a big opportunity to increase his sales of corn fertilizer. If, like tobacco growers, corn growers used fertilizer on 98.5% of their acreage, the market would jump to 637 tons. Some farmers use 500 to 800 pounds of fertilizer per acre of corn. Get the average up to 400 pounds per acre and the market in a 5-mile radius needs an additional 347 tons per year.

A recent survey of Indiana and Illinois corn growers showed that 422 of 445 used some fertilizer on corn. Only 254 of these farmers used fertilizer on oats, 242 on wheat, and 120 on legumes or pasture. Corn offers a quick and lucrative return from time spent selling fertilizer. It's a big tonnage market!

Again we tell $3\frac{1}{2}$ Million Farmers Fertilizer Grows Farm Profits

Nitrogen Division has received many compliments on its powerful and continuing campaign to educate farmers on the importance of fertilizers under present conditions. The advertisement on the opposite page is the ninth in a series of full-page advertisements directed to the attention of millions of readers of farm magazines and designed to support the entire fertilizer industry. Others will follow. We trust that this campaign is helpful in increasing your sales. Comments and suggestions will be appreciated. Write Nitrogen Division, Allied Chemical & Dye Corporation, 40 Rector Street, New York 6, N.Y.

The bank that pays BIG profits on deposits

Your withdrawals depend on your deposits whether you are putting money in your bank or plant foods in your soil. But, you get a much bigger return from the plant foods you put in your soil than you do from the money you put in your bank.

For example, 100 bushels of corn withdraws from your soil only about $28 worth of nitrogen, phosphoric acid, potash, calcium, magnesium and sulphur. And, 80 bushels of oats takes out about $20 worth of plant foods.

The plant foods you deposit in your soil in commercial fertilizers pay you big returns in extra yields of profitable crops. It's good business to be as careful about keeping your soil account in balance as you are about keeping your bank account in balance.

When you figure that $1 invested in fertilizer deposited in your soil enables you to withdraw $3 to $4 in extra yields, it's easy to see that fertilizer is your best-paying investment.

Make sure you use enough of the right fertilizer for each crop this year. Test your soil. Figure out how much of each plant food your soil needs to produce the yields you want. Get the advice of your county agent and your fertilizer dealer.

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Average for all plots harvested in 1956

	No Fertilizer	500 pounds 10-10-10 per acre
Pounds dry weight yield per acre	3,224	6,777
Pounds increase with fertilizer		3,553
Dollar value of increase per acre		$88.20

Average for all plots, 1951-56

Pounds dry weight yield per acre	2,929	6,363
Pounds increase with fertilizer		3,434
Dollar value of increase per acre		$85.85

Big Return from Fertilizer in Wisconsin Pasture Tests

$88.20 in extra dry weight per acre was the average return from 500 pounds of fertilizer, in hundreds of farm demonstrations in Wisconsin in 1957 reported by the Extension Service. The fertilizer was applied in the early spring on permanent and rotation pastures, as a part of a 6-year study of pasture fertilization.

In calculating the results of these tests shown in the chart above, the University of Wisconsin considered dry weight yield of forage as 30% of the measured green weight. Value of the increased dry weight of forage with fertilizer was arrived at by considering the dry weight equivalent to 18% dairy feed worth $50 a ton. In fields where the pasture was largely timothy, and where the first clipping was at hay cutting time, the value of the dry weight of forage was figured at $25 per ton.

The greatest single increase in pasture feed production by fertilizer was on a farm where 560 pounds of 12-12-12 fertilizer produced 5,150 pounds of dry weight forage per acre. Yield without fertilizer was only 750 pounds dry weight per acre. The extra feed produced by the fertilizer figured out at $110 per acre.

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Safety in Handling Pesticides Discussed at Health Conference

A special report for Agricultural Chemicals

SAFEGUARDING the worker's health — on the job or away from it—was the concern of representatives of labor, management, medicine and government at the seventeenth annual Congress of Industrial Health, held Feb. 4-6 at the Biltmore Hotel in Los Angeles.

Discussing phosphate ester insecticides, H. H. Golz, American Cyanamid Co., New York, said: "We have too long overlooked the safer of the phosphate pesticides . . . Paration and TEPP are too toxic for household and domestic use.

"For agricultural uses the phosphorus-containing insecticides, I feel, are safe—that is based on use according to tolerances established by the U.S.D.A. for field crops, fruits, etc. . . . We are trying to tell doctors throughout the U.S. the symptoms of these various pesticides so they will recognize the symptoms of the particular poison when a child, farmer, agricultural worker, or other person comes to them with a pesticide poisoning case.

"Although our agricultural pesticides are becoming increasingly toxic, their use is safe if people follow proper precautions in handling, application, personal safety, disposal of containers, medical treatment. . . . But we find it difficult to get across to people that these toxic pesticides will go right through the skin as if it weren't there. . . . I want to *stress* that we want to get across a *clearer picture* of how a poison manifests itself in man—and that vigorous treatment is necessary.

"In occupational use the greatest number of poisoning cases are via skin absorption. Intoxication may occur rapidly as the result of a single large dose of a potent inhibitor, or gradually over a period of days or weeks as the result of frequent small exposures.

"For poisoning cases by these pesticides there are three cardinal principles of treatment: 1—Terminate the exposure. 2—Support the respiration. 3 — Atropine. Wash sprays from skin, as they will continue to be absorbed. Respiration should be maintained by keeping a clear airway free of accumulated secretions, or by administering artificial respiration. Administer atropine in heroic doses.

"Regarding the use of these pesticides on crops—they will disintegrate and disappear within ten days after application."

Economic Facts and Laws

Concentrating his comments on agricultural chemicals, economic facts, laws and regulations, Allen B. Lemmon, Dept. of Agriculture, State of California, reported that "Crops produced in the U.S. (1956) equalled the previous high records established in 1948 and 1955, although the acreage employed was the smallest in 20 years. A large part of this increase may be attributed to the use of more and better agricultural chemicals.

"In California there are about 12,000 pesticide products registered for sale. We have a Spray Residue Law which stipulates that products may not be offered for sale if they carry spray residues in excess of permissible tolerances.

"In the enforcement of the California spray residues law 300 samples of products are drawn monthly from wholesale market suppliers of the state, and analyzed for pesticide residues. On the average about 3% of the total samples are found to contain residues in excess of lawful tolerances. . . . These inspections of produce in the market places show that our farmers are doing an excellent job not only in raising larger quantities of foods, but in controlling pests. The American food supply is undoubtedly the safest in the world.

"Usually poisoning cases come about through carelessness. Here is an example: A farmer secures a permit for the use of a highly toxic organic phosphate material. He signed a statement that he would burn, bury, or return the empty containers. He didn't. Instead, he put the empty container in a toolshed. Later his small son dragged out the container and began playing with it. The alarmed father smelled the child's breath, decided he hadn't become poisoned, took him into the house. A few minutes later the little boy staggered, collapsed to the floor. Rushed to the hospital, he died.

"You simply cannot be too vigilant in handling these toxic pesticides."

Frank A. Princi, Kettering Laboratory, Cincinnati School of Medicine, said that "In most instances, in normal doses, the chlorinated

(*Continued on Page* 118)

Dr. H. H. Golz, M.D. and Frank A. Princi, M.D., speakers on the panel "Health Hazards of Agricultural Chemicals."

Robert L. Metcalf, University of California, Riverside, and Allen B. Lemmon, Dept. of Agriculture, State of California, Sacramento.

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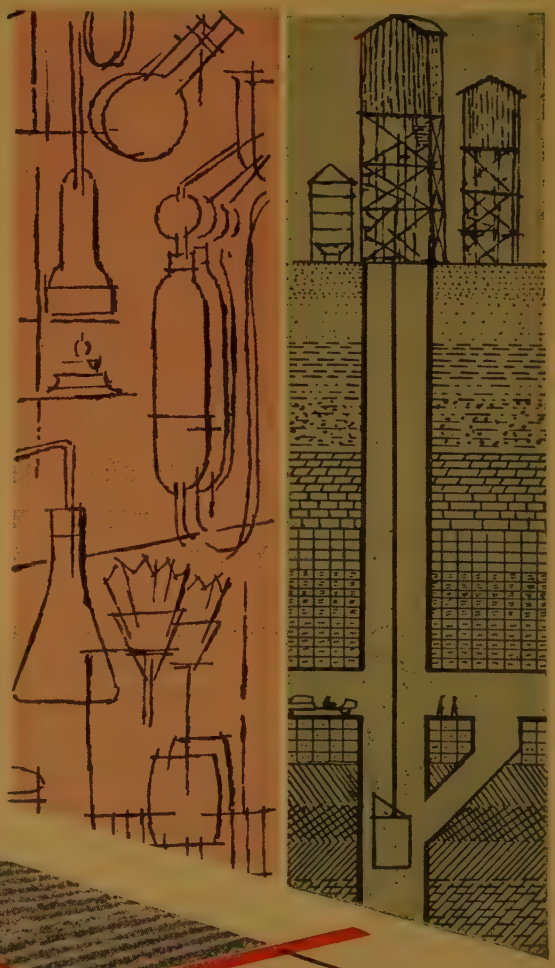

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1956 FUNGICIDE TESTS

PART 2

Ontario Report

In a full season comparison of nine dilute sprays at St. Catharines by Chamberlain, all but two gave satisfactory control. One captan analogue 859 caused injury, in form of fruit russet and leaf bronzing. Colsul containing 48% sulfur was not effective and resulted in smaller fruit. Also the change from Vancide A to M in the cover spray resulted in some late season fruit infection. First choice was captan 50W but zineb and Thioneb were equally good and Crag Fungicide was second choice. (Table 9).

Oklahoma Report

Two applications of several dormant sprays were compared in conjunction with a regular summer spray program in Oklahoma. All were safe and the best control was obtained with Puratized Agricultural Spray at five pints per 100 gallons. Santobrite at 4.5 pounds was second choice and Puratized at only 2.5 pints, third. Vapam, Dithane D-14, and Dow Lime Sulfur were considered by Converse not worth further trial at the strengths employed. (Table 10).

North Carolina Report

RUST AND SCAB

Control of rust was obtained in North Carolina with a full season of Vancide sprays or of captan + zineb (eleven applications). According to Clayton, Phybam, five applications, followed by six of captan also controlled fairly well as did a schedule of lime—sulfur, two applications, + kolospray + fermate, three applications, + Bordeaux, five applications. An experimental spray, No. 5223 also gave better than average rust control and was also outstanding in holding down scab. In the development of high finish control of early storage rots at room temperatures, the materials that seemed to afford the best protection included Phix, (two applications) + captan, (nine applications); captan, (nine applications); captan + zineb, (eleven applications); Vancide, (eleven applications); Thylate, (eleven applications); and Puratized (two applications) + captan (nine applications.) (Table 11)

Apple and Pear

FIRE BLIGHT

Control was secured in New York to the extent of 94% by one well timed application of a streptomycin sulfate only during a warm period. Laboratory tests showed that very little blossom infection took place at temperatures below 65° F. Protection is needed in the orchard when temperatures are above 70°F. during a three day blooming period. Such protection could be obtained with a single application if not delayed more than a few hours. A delay of thirty six hours in this infection period measurably reduced its efficacy. Dusts were used in some experiments but no conclusions could be drawn according to Parker, Mills and Luepschen. (Tables 12 and 13)

Pear

FIRE BLIGHT

Three antibiotics, Phytomycin, Agro-Strep, and Agrimycin used at 200 ppm and applied five times between May 4 and June 22 all gave satisfactory control of fire blight in field plots according to P. M. Miller at Mt. Carmel, Connecticut. (5)

TABLE 10
Apple Scab Control in Oklahoma (39)

Material	Conc./100 gal.	In Order of Control	In Order of Preference
Puratized Agr. Spr.	5 pts.	1	1[2]
Puratized Agr. Spr.	2.5 pts.	2	3
Santobrite	4.5 lbs.[1]	3	2
Dow L-S	1.6 lbs.[1]	3	—
Stauffer N521	2.8 lbs.	4	4
Vapam	.65 qt.	5	5
Dithane D-14	.93 qt.	6	6

[1]These two were combined but Santobrite alone was found adequate
[2]Recommended

TABLE 12
Prevention of Infection of Blossoms on King Apple in Orchard Spraying with Streptomycin Sulfate at 100 ppm in New York

Orchard	Spray application	Number Replicates	Average Number Blighted spurs per tree*
A	1 application early during warm period	10	4.63
	No spray		74.58
B	1 application late during warm period	18	148.00
	No spray		259.00

*Both differences significant at the .01 level.

TABLE 11
Relations of Fifteen Spray Programs on Golden Delicious to Control of Apple Rust and Scab and to Fruit Finish in North Carolina[1] (35)

Spray Program	% Leaf Scab	Rust Lesions per 100 lvs.	Fruits Rotted after 26 days
Phybam, 4-100 (5 sprays); Captan (50%), 2-100 (6 sprays)	18.8	4.0	16
Captan (50%, 2-100 (11 sprays)	11.2	11.7	20
No. 1564, 1½-100 (11 sprays)	34.8	22.7	34
No. 1565, 1½-100 (11 sprays)	37.8	11.3	19
Thylate, 2-100 (11 sprays)	38.5	8.3	12
Vancide A, 2-100 (6 sprays); Vancide A 1½-100 (5 sprays)	44.8	2.8	14
VancideA, 2-100 (4 sprays); Vancide M, 1-100 (7 sprays)	43.2	2.2	31
Lime-sulfur, 8 qt.-100 (1 spray); 6-100 (1 spray); captan (50%), 2-100 (9 sprays)	21.7	13.0	25
Puratized Agr. Spray, 1 qt.-100 (2 sprays); captan (50%), 2-100 (9 sprays)	26.5	15.0	10
Captan (50%) + zineb (65%), 1-1-100 (11 sprays)	25.5	2.2	11
Lime-sulfur, 6 qt.-100 (2 sprays); Kolospray + Fermate, 4¾-100 (3 sprays); Bordeaux mixture, 2-4-100 (5 sprays)	36.7	4.2	10
No fungicide	75.8	31.5	25
No. 1563, 1½-100 (11 sprays)	36.0	24.0	25
No. 5223, 1½-100 (11 sprays)	0.5	6.0	22
Phix, 4 oz.-100 (2 sprays); captan (50%), 2-100 (9 sprays)	26.5	42.5	8

[1]Parathion used as insecticide, 11 sprays between delayed dormant on March 30, and last cover spray, July 25.

TABLE 13
Prevention of Fire Blight Blossom Infection on Detached Pear Blossoms Under Controlled Temperatures in New York (34)

	Unsprayed Blossoms			Blossoms Sprayed With Streptomycin Sulfate at 100 ppm		
Temperature	Total number	Infected No.	Infected %	Total number	Infected No.	Infected %
75°F	36	12	33.3	41	1	2.4
	50	12	24.0	121	1	0.8
65°F	30	2	6.7	59	2	3.4
	157	11	7.0	95	4	4.2
55°F	58	1	1.7	43	0	0.0
	121	4	3.3	103	5	4.9

TABLE 14
Control of Apple Scab and Mildew on Three Year Old Apple Trees of Three Varieties at Hendersonville, North Carolina (36)

Fungicide	and Rate/100 gal.	Scab % Lvs. Infected	Mildew Index (0-100)
Thylate	2	46	32
Phybam	4	51	9
Manzate	1½	37	41
Captan 50	2	25	62
Vancide M	1½	60	49
Vancide Z-65	1½	50	53
Parzate	1½ on 5/1,11, 23,6/6; ¾* on 6/15,28; 7/11,25	55	30
Dithane Z78	1½	76	55
American Cyanamid 5223	1	6	24
" " "	1½	9	15
Puratized 1180 (liq.)	3 pts.	25	43
" " (W.P.)	3	26	48
Puratized 1114	3	54	38
Koloform sulfur	6	52	25
Mike Sulf + captan	3-1	38	17
Mike Sulf + Dithane Z78	3-1	40	23
Fermate	1½	73	45
No fungicide		76	31

*Karathane

TABLE 15
Apple Powdery Mildew Control at St. Catharines', Ontario (61)

Material	Rate/100 Imp. G.	Control	Exp. Pref.
Colsul	10 lbs.	2 S	1
captan + Microfine S	2 lbs. + 3 lbs.	3 S	1
captan + Karathane	2 lbs. + 1½ lbs.	1 S	2
Crag + 9116	1 qt. + 2 lbs.	4 S	2
zineb	2 lbs.	5 U	3

TABLE 16
Powdery Mildew Control, Rome Apples at Berryville, Va. (53)

Materials	% Infected Lvs.
Control	303.0
1. Phybam-S 4 lb. to ferbam 1½ + Sulfur 1½	5.6
2. Sulfur ferbam Standard (Mag.70 at 5 lb.) through first cover; Karathane in late cover sprays	5.8
3. captan standard and Mag. 70, 3 lbs. through second cover; Karathane late covers	5.8
4. glyodin standard and Mag. 70, 3 lbs. through second cover; Karathane late covers	8.3
5. Karathane 1054 at 1 lb. + B1956	9.3
6. Anisomycin, 200 to 100 to 50 ppm	12.3
7. Compound 28810—2 lbs. (incomplete)	94.9
8. Crag and Compound 9116, 2 lbs.	95.0
9. Compound 27810—2 lbs.	185.9
10. Griseofulvin—100 ppm	248.9

Pear

POWDERY MILDEW

In a study of six formulations of Karathane in two separate field plots, by Kienholz at Hood River, Oregon, employing three or four spray applications, the two showing least phytotoxicity to variety Anjou are preferred. Mildew was absent due to excessive cold in November 1955. Recommendations to growers are altered from standard Karathane 2 — 100 + 1956 wetting agent, to Technical Karathane in micro-cell + Triton X114 wetting agent. (41)

POWDERY MILDEW (Podospharea leucotricha)

In field plots sprayed five or six times at Wenatchee, Washington, Sprague obtained best control of powdery mildew of apple with Karathane and lime sulfur. Niagara polysulfides and Orthorix were also recommendable. The Omadines, both ferric and disulfide, Genite, and C&C 9116 were all unsatisfactory. In one trial Geigy 28810 looked very promising. (56)

SCAB

In field plots artificially innoculated at Mt. Carmel, Connecticut and sprayed eight times, Miller reports seven materials as giving satisfactory control, preference going to Thylate, Phygon, and captan, in that order over Mesulfare, Novsulfare, Phygon V½, and captan 50W. (5)

Fruits

SCAB AND MILDEW

Three varieties of three year old trees were sprayed eight times at Hendersonville North Carolina where Clayton and Nielson reported out of sixteen materials or combinations, the best scab control was obtained with Experimental Fungicide No. 5223. (Am. Cyanamid) The next two best were captan and Puratized 1180. The best mildew control was obtained with Phybam, No. 5223, and Mike sulfur + captan in that order. Fungicide 5223 caused small purplish flecks on young leaves, and Puratized 1180, liquid, a slight leaf stunting. (Table 14.)

Ontario Report

POWDERY MILDEW

In a comparison of five fungicides in a complete field spray program of nine applications at St. Catharines' by Chamberlain, best control was obtained by cap-

TABLE 17
Apple Powdery Mildew, Composite Rating of Ten Materials In Greenhouse Tests, From Five Weekly Spray Applications To Seedlings (53)

Fungicide	Conc.	Rating
1. Ialine colloidal sulfur 40%	1200 ppm	.4
2. Phybam-Sulfur	4000 ppm	2.1
3. Actidione	2.5	3.3
4. Karathane	300.	6.3
5. Anisomycin	50.	23.3
6. Griseofulvin	100.	26.3
7. No. 2153 (Hercules Powder)	1200	37.1
8. No. 28810 (Geigy)	1200	38.8
9. Dichlone	150	45.8
10. No. 9116 (Carbide and Carbon)	1500	48.8

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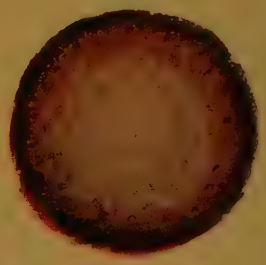

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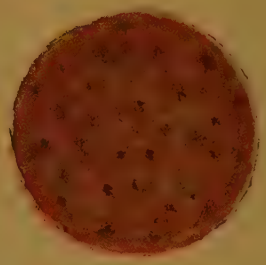

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tan and Karathane, though some phytotoxicity was obtained, and second best by Colsul. Zineb and Crag + 9116 were least satisfactory. (Table 15.)

Virginia Report

Several all season schedules were again orchard tested by Groves for powdery mildew control on Rome apples at the Winchester, Virginia fruit research laboratory. (Table 16.) These gave good control where either sulfur or Karathane was added. The best three schedules were a Phybam-Sulfur to ferbam-Sulfur combination; a Sulfur-ferbam through first cover with Karathane in late cover sprays; and a captan and Magnetic sulfur through second cover with Karathane thereafter. Anisomycin, though effective was too phytotoxic at 200 and even 100 ppm, while Griseofulvin was not effective at 100 ppm.

In greenhouse tests, also by Groves, (Table 17.), Ialine colloidal sulfur, 40%, at 1200 ppm; Phybam-Sulfur at 4000 ppm; Karathane at 400 ppm; and Actidione at 2.5 ppm gave fine powdery mildew control where five weekly applications were made beginning in mid-June. All but the last are recommended for grower use.

Apple

POWDERY MILDEW

In Delaware the best control of mildew was obtained with one pound of Karathane, or four pounds of magnetic 70 sulfur paste. Higher rates of sulfur up to eight pounds caused some injury. CC9116 at one and one half pounds gave poor control but no injury. Sulfur and Karathane are being recommended to growers by Heuberger. (7)

SOOTY BLOTCH

A comparison of zineb, captan, and captan + zineb made in Delaware by Heuberger and Sayed, showed that zineb was superior for sooty blotch control. The experimenters' preference, however, was for a mixture of captan + zineb, one pound each, from prepink to first cover spray, followed by the same at reduced rate ¾ + ¾ pounds through ninth cover spray. Zineb was second choice at two pounds up to first cover and at one and one half thereafter. Captan is not recommended for sooty blotch control. (8)

PHYLLOSTICTA BLOTCH

Good control was obtained with Thylate and Dithane Z78, and fair control with captan and Omadine in replicated single tree plots sprayed twice a month in Oklahoma, according to Struble and Morrison. Omadine was slightly irritating to skin of operator. Thylate and Dithane were the first choices of the experimenters but captan is being recommended. None was phytotoxic. (Table 18.)

SOOTY BLOTCH AND FLY SPECK

Both captan and zineb were found toxic to the sooty blotch and fly speck fungi in laboratory tests in Pennsylvania, by Lewis and Hickey. Captan failed to control these diseases in the field with spray schedules common to this area, while zineb has been effective. In tests on Stayman and Grimes in 1956, sooty blotch and fly speck were controlled by either captan or zineb so long as sprays were continued at half-month intervals. After sprays were stopped, both diseases appeared on captan-sprayed trees within five to six weeks, and on zineb-sprayed trees within about two months. The intervals were slightly longer in September and October and may have been affected by cool weather and an increase in the concentration of fungicide from one and one half pounds, to two pounds late in the season.

Pennsylvania results indicate that the failure of captan to control sooty blotch and fly speck late in the season is due to a lack of persistence of captan residue on fruit. It should be satisfactory wherever sprays can be applied up to six weeks before harvest. (Table 19.)

WHITE ROT (Botryosphaeria ribis)

In a comparison of various combinations of zineb, captan, and thiram on Rome apples in Delaware as sprays from fourth to twelfth cover, between June 22 and September 17, Heuberger and Sayed found all combinations and rates of applications gave satisfactory control and all were safe. Their first preference from standpoint of over all disease control was captan + zineb, one pound each. But for white rot control alone captan at one and one half pounds was as good as anything. All materials used were recommendable, however. (Table 20.)

Peach

BROWN ROT

Partial control of twig cankers coming from brown rot blossom blight was obtained in Pennsylvania by Lewis from a pink spray plus one bloom spray even when each application was made the day after a one-day infection period. Thioneb was best, with Phygon next, and captan, third. Sulfur alone was ineffective. (Table 21.)

Part 3 of the 1956 Fungicide Tests will appear in April, 1957, *Agricultural Chemicals*. Orders now being taken for reprint of the complete test results by A. G. Newhall, Cornell University, Ithaca, N. Y. Price $1.00.

TABLE 18
Control of Apple Blotch in Oklahoma (40)

Fungicide	Rate/100 g	% Dis. Free Fruits	Exper. Pref.
Thylate	1½ lbs.	97	1
Dithane Z78	1½ lbs.	98	1
Captan 50	2 lbs.	96	2
Omadine	1½ lbs.	95	3
Check		73	

TABLE 19
Sooty Blotch And Fly Speck Control In Pennsylvania (44)

Material	Lbs./100 g	Days from last spray to date counts made	Sooty Blotch Per cent	Fly-Speck Per cent
captan	2	96	100	98
captan	1½	82	99	86
captan	1½	66	90	58
captan	1½	51	17	17
captan	2	36	0.5	0.8
captan	2	21	0.3	0.0
captan	2	2	0.0	0.0
zineb	2	96	99	62
zineb	1½	82	56	14
zineb	1½	66	24	5.0
zineb	1½	51	0.5	0.0
zineb	2	36	0.1	0.0
zineb	2	21	0.1	0.0
zineb	2	2	1.1	0.8

TABLE 20
Control of Apple White Rot in Delaware (8)

Fungicide	Lbs./100 g	Exper. Pref.
Zineb	1 — ½	3
Captan	1 — ½	4
Captan + Zineb	1 — 1	1
Captan + Zineb	¾ — ¾	2
Captan + Zineb	¾ — ¾[1]	2
Thiram + Zineb	¾ — ¾	2

[1]Discontinued at 10th Cover

TABLE 21
Brown Rot Twig Canker Control in Pennsylvania (44)

Material	Pounds per 100 gal.	Cankers per tree
Thioneb	2	44
Phygon	½	71
Kolo 100 special (+ Phygon)	3¾ (+ ½)	80
glyodin and Phygon	¾ qt. + ½	84
Micr. Sulfur + Phygon	3¾ + ½	86
Micr. Sulfur + Phygon	3¼ + ¼	95
captan	2	89
Kolo 100 (+ Phygon)	3½ + ¼	94
captan and micr. sulf.	1 and 3¼	95
Micr. sulfur	6½	135
Check		142

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"There were lots of reasons. But the clincher came the day we learned that our neighbors, Lehigh Stone Company of Kankakee had changed to Michigans and were very happy with them. If a Michigan could work satisfactorily under the constant use of their quarry, we reasoned it certainly would do well on our less-punishing job. The size we wanted, Michigan's 15 cubic foot Model 12B, we noted had many of the same design features as the larger quarry-model Michigans (including power-shift, torque converter, planetary axles). So we got it —and it's done even better than we hoped."

Drives safely, quickly in traffic

Today the 44 hp, 11 mph Michigan does *all* handling and *all* lifting not only at Hoover's main plant but also at their auxiliary warehouse four blocks away. Trips back and forth take only two to five minutes despite necessity to travel along the town's busy main street (U.S. 54-45-24).

Easily maneuvers through 5′ door

Unloading boxcars is a typical job. Average 50 ton car requires less than 100 trips for complete unloading, according to Owner Hoover. *"Michigan has no trouble getting in or out of any single-door car,"* he adds, *"regardless of whether it has a 5-foot or 6-foot door.* Our bucket has been extended two inches, too, over the standard bucket."

Feeds mixer, lifts bags, spots cars

Other Michigan jobs include stockpiling bulk phosphate, potash, urea and other raw materials and feeding the one-ton mixer. Michigan also hauls bags of mixed fertilizer. It loads both bagged and bulk material onto trucks. It spots boxcars, one or two at a time, both loaded and empty. Despite its heavy work schedule a simple maintenance program has reduced downtime to practically zero.

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M. W. S. I. C. Discusses Fertilizer Placement

By H. H. Slawson

THE ninth annual joint conference between college agronomists and the fertilizer industry drew over 700 persons to the Edgewater Beach Hotel, Chicago, Feb. 14 and 15. Among them are research and extension soils specialists from 13 midwestern land grant colleges, fertilizer industry men, farm equipment manufacturers and representatives of allied industries.

The program, as customary, included reports on research in progress at various colleges, with lengthier attention to one special problem, which, this year, dealt with the need for increased education on correct placement of fertilizer in the row for corn.

Stressing the heightened need for accurate fertilizer placement where it can do the most good, Zenas H. Beers, executive secretary of the Middle West Committee, reported that corn belt farmers are using three times as much fertilizer today as they did at the end of World War II.

"Not only are more pounds of fertilizer going into more acres of corn and small grain," said Mr. Beers, "but each pound of fertilizer contains more nutrients."

Complaints of injury to germinating seedlings of corn and small grain are increasing, he said, due to the poor fertilizer placement. Most of the placement equipment now in use, he charged, was not designed for today's fertilizer, nor for the speeds at which modern tractors travel.

Widespread use of equipment designed to handle modern fertilizer would, Mr. Beers declared, result in top efficiency and profits from fertilizer use and avoid the hazards of germination injury. Few farmers, he charged, know that the suitable equipment is available.

"We need to convince the farmer," Mr. Beers declared, "that accurate placement is worth money to him and that he should ask for placement equipment that will do the job right." He promised that the fertilizer industry will cooperate with the implement makers and the colleges in an educational program to provide farmers with information on what good placement equipment can mean to them.

W. H. Garman, chief agronomist, National Plant Food Institute, Washington, D. C., added his assurance that the fertilizer industry stands ready to participate in the intensive educational program seen as necessary to get the correct fertilizer application equipment into the hands of all farmers who need it.

"Farmers must first be told," said Mr. Garman, "that good application equipment is on the market. Very few of them know that today. The farm machinery industry must also strive to sell the proper type of equipment and cooperate with the colleges in discouraging sales of the outmoded split-boot applicator."

Proper placement of fertilizer, Mr. Garman stressed, can help solve the costly problem of germination injury to corn, which has become so extensive in the past two years. Two factors are holding back widespread adoption of proper placement methods, he asserted. First is the lack of equipment for placing fertilizer at a safe distance from the seed, and, second, is the lack of definite placement recommendations by all the midwestern colleges. Only four of them, he stated, have published specific recommendations for band placement of starter fertilizer. This, he explained, is one finding from a recent survey by the National Joint Committee on Fertilizer Application.

Tractors, today, Mr. Garman continued, travel much faster than the speeds for which planters and fertilizer attachments are made. As a result, skips and seed cracking occur —and, in addition, split-boot applicators place the fertilizer in with the seed or even above it, when tractor speed is too high.

"Michigan studies indicate," he said, "that for every mile in excess of three per hour a tractor travels, the number of germinating corn plants is reduced by 800 to 1,000 per acre."

As a result of the survey, he said, midwestern colleges are unanimous in recommending that starter fertilizer be placed in a continuous single band, approximately two inches to the side of the seed and from seed level to two inches below the seed.

Referring to the many problems that have arisen in fertilization of small grain, he declared that until grain drills which will properly separate the fertilizer from the seed are in the hands of the farmers, the colleges will continue recommending less than the required amounts of plant food.

"And, until farmers have the proper type of equipment in hand," he concluded, "they will be operating below top efficiency."

The seedling stage is probably the most important in the corn plant's life cycle, Dr. A. J. Ohlrogge, Purdue University agronomist declared in an address on "What Happens When Corn Root Meets Fertilizer Band." In this period, he said, there is a partial development of all leaves, the root system, auxiliary buds, internodes and primordial tassels. Band fertilization at corn planting time is thus essential in getting the crop off to a good start.

Another Purdue agronomist, Dr. Stanley A. Barber, reported that row fertilization needs to be reinforced by broadcast application of plant food for top yield of corn. Top yields can not be obtained by row fertilization alone, he claims. While fertilizer was formerly applied in the row, he said, the greatly increased per acre application rates in recent years have encouraged the trend toward adding at least a part of the plant food by broadcast methods.

He outlined the methods followed in tests covering five years, pointing out that row application of potash is effective in increasing corn yield and also the percentage of potash in the leaf. Since potash is relatively inexpensive, he suggests that it may be more economical, as well as a safeguard against salt injury, to apply a part of it broacast.

Nine out of ten farmers work their land too much before planting the seed, it was claimed by Walter

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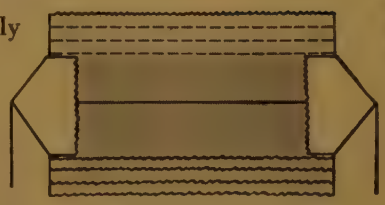

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J. Mumm, agronomist with Crow's Hybrid Corn Co., Milford, Ill.

"Too much tillage with heavy machinery" said Mr. Mumm, "packs down the soil rather than opening it up. It plugs soil pores, breaks down desirable structures, slows drainage and aeration and makes it difficult for roots to penetrate. This can result in lower yields of corn, wheat and other crops."

In one of the four papers reporting on current research projects, Dr. Wm. A. Albrecht, Univ. of Missouri soils scientist, asserted that a big market for fertilizer lies in using plant food to grow higher quality protein feed for livestock.

In a review of fertilizer research in South Dakota, Dr. L. F. Puhr, agronomist at South Dakota State College, Brookings, S. D., reported that hay yields were boosted as much as 2½ tons per acre and protein production increased by 793 pounds when brome grass was fertilized with nitrogen in irrigated fields. Other similar results were recounted from use of fertilizer in varied quantities. Fall fertilization of wheat, he stated, has given highly favorable results and is now a recommended practice in South Dakota.

Dr. C. M. Woodruff, Univ. of Missouri agronomist, reported in detail on a project of seven years duration, to determine the efficiency of phosphorus with respect to amounts applied and time of application. Heavy application of phosphorous fertilizer can be profitable over a period of years on a meadow crop on soil that has sufficient nitrogen and potash, he concluded, submitting dollars and cents figures to support this claim.

Dr. J. F. Davis, professor of soil science, Michigan State College, Lansing, Mich., summarized soil fertility research in eleven different areas, with special attention to one project involving a field which had been "scalped" of its top soil. Speaking of the minimum tillage practices followed in Michigan, Dr. Davis, said that by making minimum tillage a part of the crop production management program, farmers could save $3 to $7 per acre in labor, fuel and machinery costs.★★

Discusses Role of Pesticides at Canners Meeting

ADDRESSING the 50th annual convention of the National Canners' Convention, held in Chicago, February 18th, Fred W. Hatch, manager of the agricultural chemicals division of Shell Chemical Corporation, and president of the National Agricultural Chemicals Association, outlined the role of the manufacturer and formulator in producing chemicals for crop use which will result in canning "crops of high quality, free of insects and worms, unblemished by blight or other fungus damage or virus diseases, and *without harmful residues.*"

Mr. Hatch observed that from a purely economic standpoint the canner is concerned with the ability of the farmer to produce crops efficiently, and at reasonable costs . . . that to these two objectives are also directed a major part of the effort of agricultural chemicals research, development, and marketing. Mr. Hatch elaborated on the background of pesticidal treatments of crops, costs of research and the Miller Residue Law.

"The pesticide phase of the chemicals industry," said Mr. Hatch, "is comprised of approximately 100 manufacturers of one or more basic chemicals. These materials are used in producing some 216 chemical compounds which are used as pesticides. Supplementing the active insecticide compounds," he noted, "there are about 75 relatively inert chemicals or substances, which are used as diluents and/or adjuvants in the formulation of pesticides so that they may be applied effectively and safely by the grower and other users. *The volume and complexity of the pesticide industry can best be judged by the fact that the above mentioned chemicals are formulated into more than* 6,000 *trade-named products by more than* 300 *companies in the United States.*"

The new organic chemicals have revolutionized all aspects of pest control, said Mr. Hatch, citing as an example the fact that control measures of codling moth on an acre of apples a few years ago required eight sprays totaling 6 to 8 thousand gallons and containing 400 pounds of lead arsenate. That much arsenic applied to an orchard every year, observed Mr. Hatch, would soon poison the soil more or less permanently. Today, he continued, codling moth is no longer a major pest in the apple industry . . . and we can get better control with one pound of parathion, plus eighteen pounds of DDT than we ever got with the lead arsenate treatment. Furthermore, there will be no poisonous residue on the fruit after a few days and none on the ground.

The agricultural chemicals industry is continuing its program of research and development on new and better products. Some of the larger companies are plowing back 10% or more of their sales proceeds into research programs. On an industry wide basis, the average is probably 4 to 5%. Correlating this percentage to estimated 1956 sales of $250,000,000 of basic toxicants at the manufacturers' price levels, it follows that the chemical industry is investing $10-$15,000,000 per year in its research for new and more efficient pesticides.

Industry costs are further increased however, by the lengthy and costly additional tests required after finding a compound which shows promise as a pesticide. Costs of toxicity studies alone for one single compound approximated $500,000, Mr. Hatch reported.

He followed these observations with reports on the role of the USDA in agricultural research, tests required for registration under the Miller Law, and general comments on the cooperative efforts of the National Agricultural Chemicals Association.

In concluding, Mr. Hatch observed that "we must look to fundamental research for broadening our knowledge in the fields of basic chemistry and biochemistry. From these programs we should be getting a constant stream of new chemicals for growth regulations, weed control, and fungus control. New systemic insecticides, miticides, and fungicides could conceivably eliminate or at least alleviate some of the toxic residue problems which presently worry us. There are hundreds of places where new soil chemicals not yet available to us could increase yields, reduce labor costs, and actually save crops."

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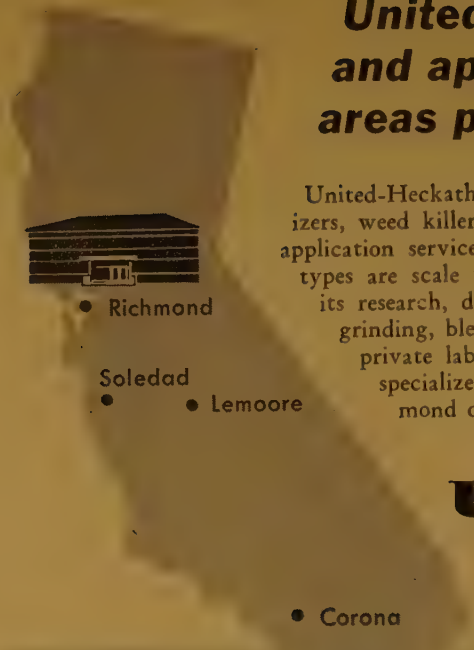

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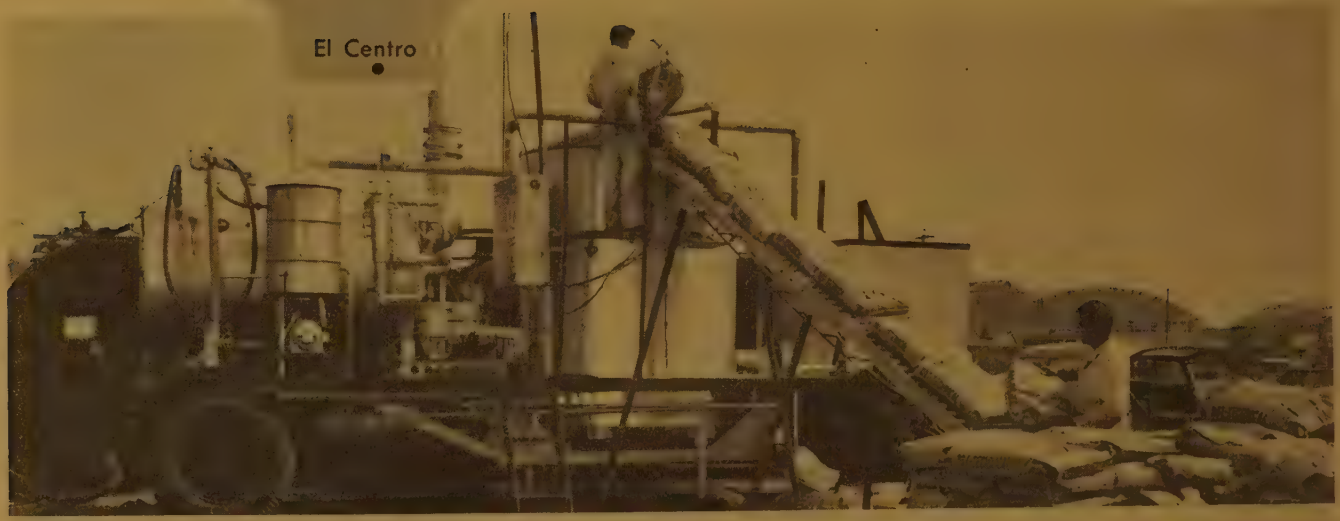

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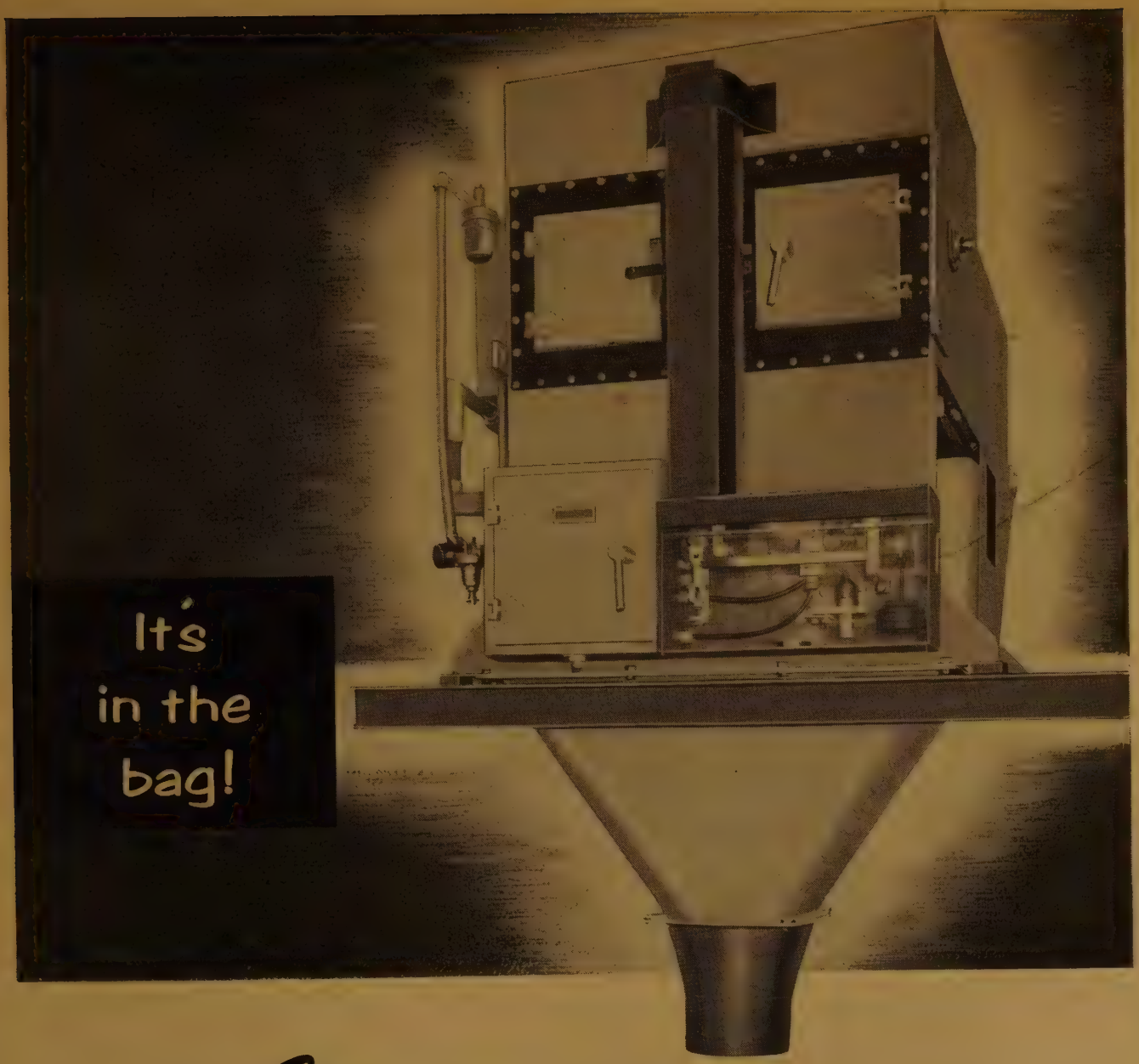

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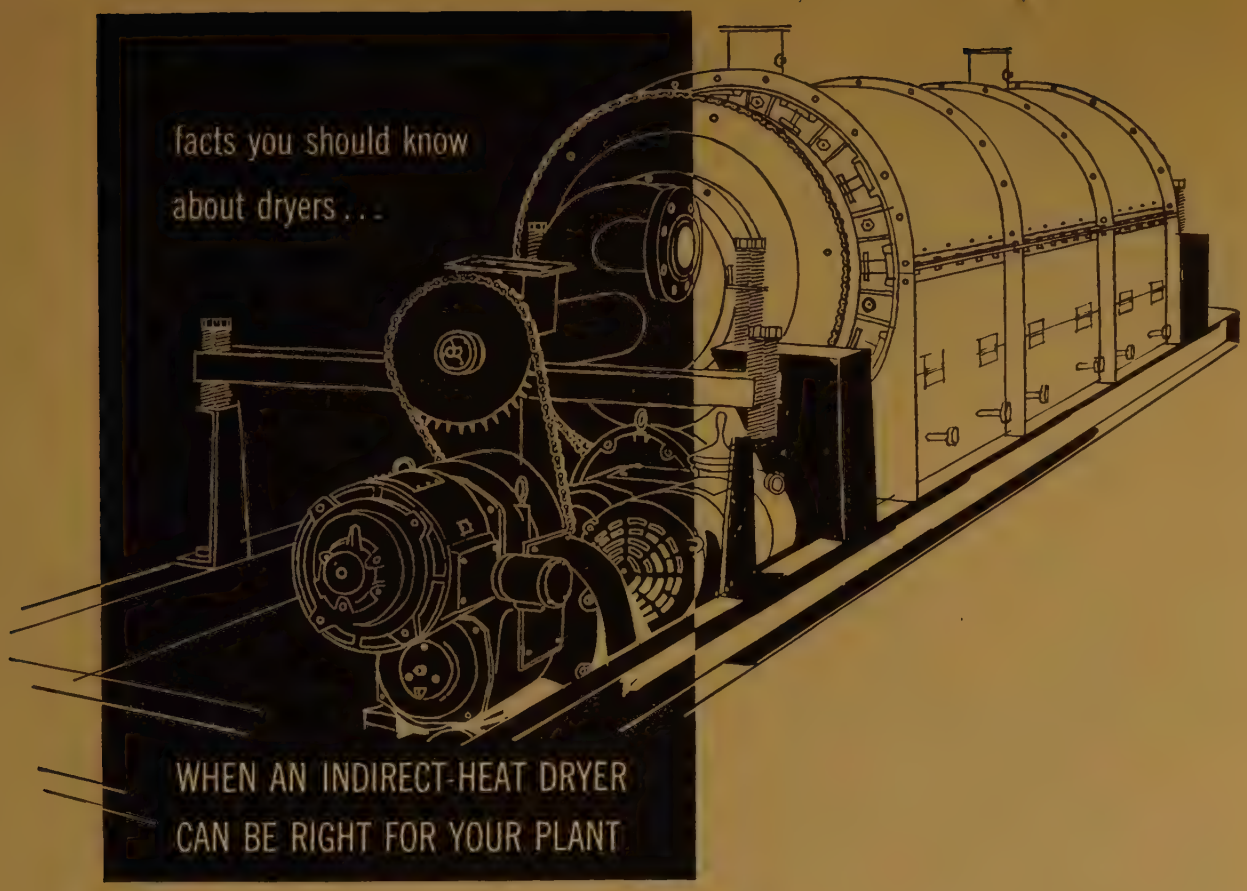

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A. You might consider using a direct-heat rotary dryer that utilizes clean, heated air as the drying medium—air heated by steam coils or a gas or oil fired heat exchanger. However, this introduces a considerable dust collection problem. Besides, from a standpoint of capacity, it is inefficient as well as from a heat-cost standpoint. This makes it unduly expensive. Therefore, a type of indirect-heat rotary dryer is indicated which would greatly reduce both the dust problem and the heat cost.

Q. *What is meant by an indirect-heat rotary dryer?*

A. One in which the material to be dried is warmed by contact with the heated metal surfaces, which in turn are heated by the medium used (usually furnace gases or steam). Those using furnace gases are called "indirect fire dryers". Atmospheric and vacuum drum dryers are examples of steam-heated indirect dryers, but the type in greatest use is the steam tube dryer. This is often referred to as the "Louisville Type" because of the thousands of Louisville Steam Tube Dryers built during the past 55 years.

Q. *How does an indirect-heat dryer minimize the dust problem?*

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Q. *How does this differ from the operation of a direct-heat dryer?*

A. In direct-heat dryers, the hot air furnishes the heat for drying besides removing the evaporated moisture. The amount needed to supply the necessary heat results in a sufficiently high velocity through the dryer to carry out an excessive amount of fine material particles.

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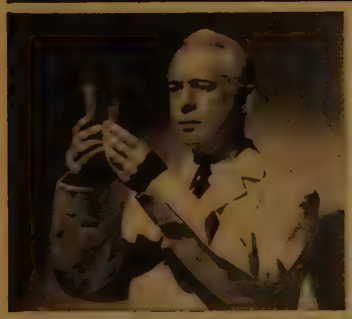

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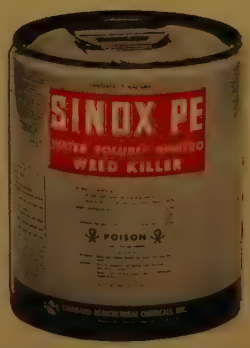

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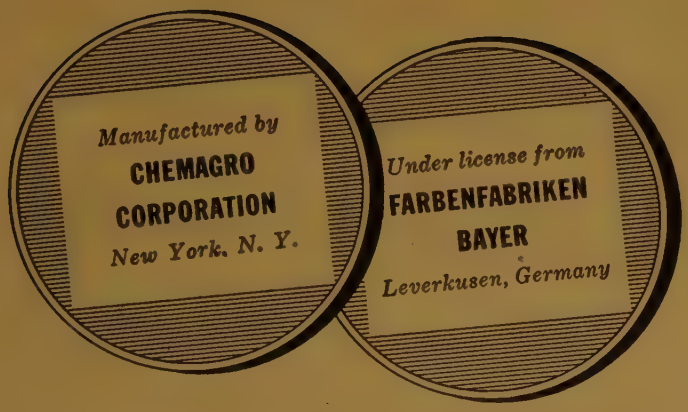

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GUTHION is a new and highly efficient insecticide for control of boll weevil and other cotton pests. In extensive field tests conducted during the past two years, GUTHION has consistently exhibited outstanding control of cotton boll weevil.

*Trademark

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REMAIN FREE-FLOWING...

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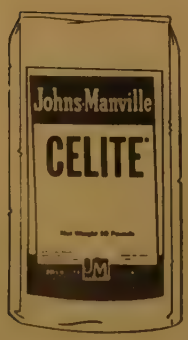

The ability of Celite* diatomaceous silica to absorb its weight in water or oil pays off for insecticide formulators in two ways. (1) Celite absorbs large quantities of liquid poisons while retaining the easy-to-handle properties of a dry dust. (2) Celite's powerful anti-caking action keeps dusts free-flowing and assures uniform poison dispersion in wettable powders prepared by final packagers.

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*Celite is Johns-Manville's registered trade mark for its diatomaceous silica products

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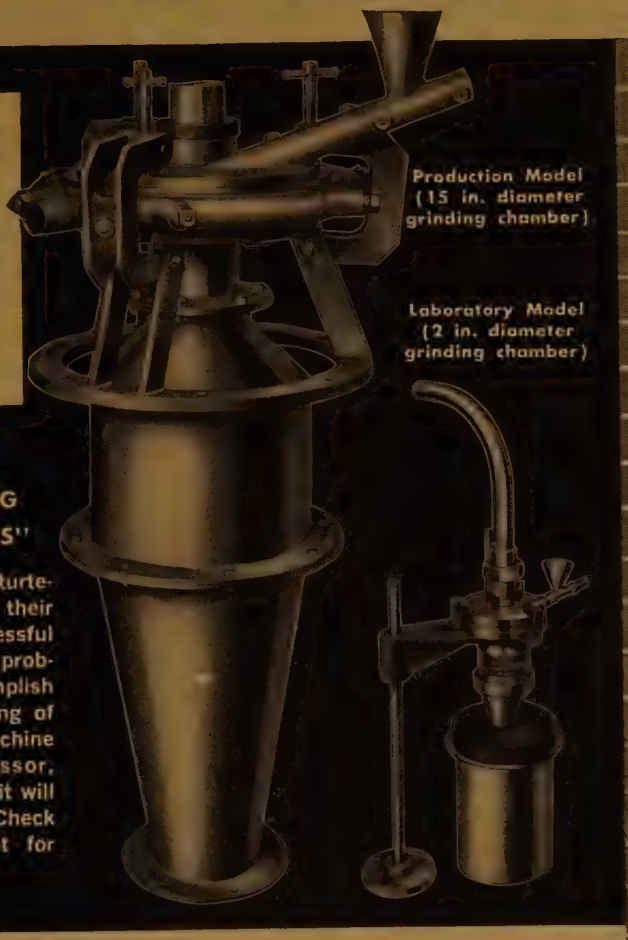
An ideal Grinder for the production of Insecticide Compounds from DDT, Aldrin, Dieldrin, BHC, etc.

The increased surface area from this type of grinding means greater bulk, for better dispersion and wettability, requiring less amount of wetting agent.



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. . . comes naturally to Sturtevant engineers — with their 75-year tradition of successful solving of dry-processing problems. If you want to accomplish the most effective grouping of a Micronizer* Grinding Machine with necessary compressor, feeder and dust-collector, it will pay you to investigate. Check the coupon on the right for more information.

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* Registered trademark of Sturtevant Mill Co.

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AMMONIA AND NITROGEN SOLUTIONS

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There is a Standard Oil office in every major marketing area in fifteen Midwest and Rocky Mountain states. Experienced representatives are located in each of these offices to help you with the purchase of NH_3, Aqua Ammonia and Nitrogen Solutions.

Perhaps one of these men is already calling on your plant providing technical service on Standard Oil petroleum products. He knows your methods of ordering and warehousing and your delivery requirements. He will handle your orders for Ammonia and Nitrogen Solutions and give you the kind of service on these products that you have become accustomed to receiving from Standard.

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For more information about Nitrogen Products ask your Standard representative. Call the nearby Standard Oil office or write Standard Oil Company, 910 South Michigan Ave., Chicago 80, Illinois.

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(Indiana)

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NEWS about the TRADE

Rebak, Pres of Salesmen's Asn.

V. L. Rebak, New York district sales manager for Grace Chemical Co., was inducted as the 1957 president of the Salesmen's Association of the American Chemical Industry. The installation took place at a luncheon in the Hotel Commodore, New York, late in January.

•

V-C Settles Howell Suit

Virginia-Carolina Chemical Corp. will pay its former president, Joseph A. Howell, $20,000 a year for 15 years under terms of a private settlement of a lawsuit, according to a recent report.

Mr. Howell had filed a $435,000 suit against V-C in November in Law and Equity Court. He charged that the firm, from which he was ousted during a proxy fight last summer, had repudiated his 10-year employment contract.

V-C never filed an answer to Mr. Howell's suit. Under a contract executed in December, 1953, Mr. Howell was assured a minimum salary of $60,000 a year.

•

GES Meeting March 19-20

The twenty-first meeting of the Georgia Entomological Society will be held at Rock Eagle 4-H Camp near Eatonton, Ga., on March 19 and 20.

•

Heckathorn Buys N. J. Firm

The United-Heckathorn Co., Richmond, Calif., has purchased the assets and business of F. H. Vahlsing Insecticide & Chemical Co., Robbinsville, N. J. The effective date of Heckathorn's taking possession of the Vahlsing company was Feb. 1.

Harold Bowen, manager for F. H. Vahlsing, has been retained in that position for United-Heckathorn at the Robbinsville plant. Additional equipment is being installed for liquid and concentrate manufacturing.

•

Epstein Forms Sole Chemical

Sole Chemical Corp., 27 East Monroe St., Chicago, was recently organized as a highly specialized chemical marketing organization by Solomon Epstein, former executive vice president and general manager of Emulsol Chemical Corp. Mr. Epstein, president and general manager of the new company, stated that the new firm will base its organic specialty sales program on a customized technical service program to the chemical processors, formulators, and manufacturers of detergents, emulsifiers, germicides, and other surface active agents.

Mr. H. Zagerinsky has been named manager of production of the new firm. He was formerly in production control at Emulsol.

•

Naugatuck Names Brasfield

T. W. Brasfield has been named Los Angeles district manager for the Naugatuck Chemical division, United States Rubber Co., New York. Mr. Brasfield supervises the sale of all the division's products in the eleven western states covered by his district.

•

Hercules Sales Up

The Hercules Powder Co., Wilmington, Del., achieved record net sales and operating revenues of $235,902,914 in 1956, a gain of 4 per cent over the volume for 1955. Earnings, however, dipped 6.9 per cent.

Albert E. Forster, president of the company, attributed the decline in earnings to the fact that prices did not keep pace with increases in costs.

Jones Directs Arkell Sales

Tom L. Jones is the new director of multiwall sales for Arkell & Smiths, New York. Mr. Jones joined the bag concern as a salesman for the Ohio area. For the past year he has been vice president and eastern division sales manager.

•

Materials Handling Show

The National Materials Handling Exposition will be held at Convention Hall, Philadelphia, April 29 through May 3. In addition to a trade exhibit, some 32 speakers will address the conference during the meeting. Of interest to the agricultural chemicals industry will be the following reports:

"How to Select Material Handling Equipment," C. H. Wolf, Dow Chemical Co. "How to Get Handling Equipment without Capital Expenditures," J. R. Wood, Jr., Clark Equipment Co. "What is Being Done about Shipping and Handling Bulk," T. F. Mangold, E. I. du Pont de Nemours & Co. "What we Need to Know about Outdoor Protection," M. J. Odell, McLaurin Angier Corp.

•

Pesticide Trials Service

Hazel & Thomas Pacific Coast Pesticide Trials, Bakersfield, Calif., is a new service in California being offered to the agricultural chemical industry. The service will make arrangements for test plots, supervise applications, make photographic records, collect biological data such as insect counts, yield information, residue samples for analysis.

Both Mr. Hazel and S. L. Thomas will continue their entomological consulting practice.

N. Y. Hosts Garden Show

A record number of dealers and distributors attended the 16th annual National Garden Supply Show held at New York's Coliseum on Feb. 17, 18, and 19, which featured new retail selling ideas as well as new merchandise.

A short course in Retail Sales Management which was given on the day preceding the show was attended by more than 1500 persons. The course, devoted to the important factors in retail selling, was developed expressly for garden supply retailers by Garden Foundation, Inc., a research and education organization.

Exhibited in the almost 600 booths at the show were plant foods, applicating equipment, new packaging ideas, and dealer-assistance merchandising plans.

Stauffer Chemical Co., Omaha, Neb., displayed the new soil fumigant, "Vapam," which is used on lawns to eradicate weeds, fungi, and other soil pests.

An exhibit by Merck and Co., Rahway, N. J., demonstrated the new growth stimulant "Gibrel." Sprayed on the leaves of plants, Gibrel acts to increase the plant's growth by stimulating the photosynthesis activity of the plant.

Many firms exhibited their products in aerosol containers. E. I. du Pont de Nemours and Co., Wilmington, Del., showed their squeeze dusters which come in both selective and all-purpose types.

•

DuPont Technical Specialists

Appointment of three technical specialists who will provide customer services for "Uramon" ammonia liquors was announced by Du Pont's Polychemical's Department.

Appointed are: Ove F. Jensen for the Midwestern states, John Spicer, Jr. for the Southeastern states, and Philip B. Turner for the Northeastern states.

•

C.-V. P.F.A. to Meet May 13-15

The Carolina-Virginia Pesticide Formulators Association will hold its third annual spring convention at the Cavalier Hotel, Virginia Beach, Va., May 13-15. Program details will be announced at a later date. Reservations should be made directly with the hotel with copies to W. R. Peele, secretary-treasurer, P. O. Box 7, Raleigh, N. C.

•

Warfarin Patent Upheld

A recent dispatch from Tokyo indicates that the Wisconsin Alumni Research Foundation's patent for warfarin has been favorably interpreted in Japan.

The Toko Chemical Co., Ltd., Tokyo had sought a declaration of the Patent Office Tribunal to the effect that its process of making warfarin was outside of the Foundation's warfarin patent.

"This proceeding in Japan illustrates the Foundation's determination to maintain and defend its patents, in litigation if necessary, even in foreign countries," Ward Ross, managing director of the Foundation declared.

•

Unique Potash Warehouse

One of the largest timber-framed structures in the southwest has been constructed for the Potash Co., of America at Carlsbad, N. M. The huge structure, warehouse No. 7, is an arched-bent design with timber buttresses anchored into a continuous, concrete pilaster wall which in turn supports large, three-hinged, glulam wood arches.

Potash Co. officials are enthusiastic about their wood-framed warehouse, claiming that in addition to a low cost, the frame structure has many other advantages.

New Delta Chemical Plant

Andy N. White

A new agricultural chemical formulating plant and sales office is being built in Indianola, Miss., by the Hayes - Sammons Chemical Co., Mission, Tex. The new plant, which is expected to be completed this month, will serve all states in the Mississippi Delta.

Andy N. White, entomologist and sales manager of the chemical division at the Mission, Tex., office for the past five years has been transferred to Indianola to be general manager of the Delta Division plant and sales. Arthur E. Smith Jr., assistant production superintendent at the Mission plant, will be the production superintendent.

•

CFC Scheduled for April 14-15

The fifth annual California Fertilizer Conference, sponsored by the Soil Improvement Committee, California Fertilizer Association, will be held on the campus of Fresno State College, Fresno, April 14-15. J. H. Nelson and E. R. Mog both of Stockton, are co-chairmen.

•

USDA Develops New Repellent

A new all-purpose insect repellent "best of all so far developed," has been released by the U. S. Department of Agriculture for commercial use. The department says it will probably be available on the market this spring.

The repellent is an organic chemical, diethyl toluamide . . . which was synthesized some years ago by USDA chemists at the Agricultural Research Center, Beltsville.

New officers elected at the tenth annual Southern Weed Conference: Left to right: Dr. R. Behrens, USDA, Texas Agricultural Experiment Station, College Station, Tex., vice-president; Dr. W. B. Albert, Clemson College, S. C., retiring president; Dr. E. G. Rodgers, University of Florida, president; and Dr. W. K. Porter, Louisiana State University, secretary-treasurer.

Miss. Crop Dusters Meet

The first annual meeting of the Mississippi Aerial Applicators Assn. was held in Gulfport, Miss., on Feb. 14 and 15 in the Edgewater Gulf Hotel.

Now in its first full year of operation, the association represents 35 crop dusting firms in Mississippi. A main feature of the meeting was the educational panel on correct usage of insecticides, fertilizers, and defoliants. A. G. Bennett, Mississippi State College Entomological Department, discussed current poisoning recommendations and Dr. Merkl, Stoneville Branch Experiment Station, headed a panel on phosphate insecticides, outlining current recommendations and safety measures.

•

Southern Safety Conference

The eighteenth annual Southern Safety Conference, being held in Richmond, Va., on March 3, 4, and 5, will feature a talk on the safe handling of anhydrous ammonia and ammonium nitrate solutions by C. E. Franklin, Phillips Petroleum Co., Bartlesville, Okla.

Mr. Franklin will address the fertilizer section of the conference and will be followed by a panel discussion titled, "What a Good Safety Program Can Do for the Fertilizer Industry."

•

Bagpak Appoints Pair

Bagpak Division of International Paper Co., New York, has appointed Chester M. McCord as manager of manufacturing and Asa S. Morgan as his assistant. Both men are making their headquarters at Camden, Ark.

Bagpak has multiwall sack manufacturing plants at Mobile, Ala., Bastrop, La., and Camden, with a fourth plant under construction at San Jose, Calif.

•

New Cyanamid Insecticide

American Cyanamid Co., New York, developer of parathion and malathion, has expanded its line of organic phosphate insecticides to include methyl parathion technical. The material can be used in the manufacture of emulsifiable liquids, wettable powders and dusts. Methyl parathion has proved particularly effective in combatting boll weevils which have developed resistance to chlorinated hydrocarbon insecticides.

•

Pa. Studies Pesticide Bill

A bill fixing penalties for the "distribution, sale, or transportation of deficient or mis-branded insecticides, fungicides, rodenticides, and other pesticides," was introducted recently in the Pennsylvania State Legislature. Among its other features, the bill, which is currently under study by the legislative committee on agriculture and dairy industries, sets a registration fee of $7.50 per brand annually for the first ten brands and $2 for each additional brand, and provides for an optional labeling clause.

Labelling requirements set up by the bill specify that labels must contain instructions for use, appropriate warning statements about its toxicity under certain conditions, and a complete ingredient statement.

•

Indiana Standard Buys Firm

Standard Oil Co. (Indiana) has acquired all outstanding common stock of Schrock Bros. Co., fertilizer firm at Congerville, Ill. The company will continue in business as a Standard Oil affiliate principally for the sale of anhydrous ammonia in Illinois, Indiana, Iowa, Nebraska, and Kansas.

•

Pfizer Acquires Patent

A process patent has been acquired by Chas. Pfizer & Co., Inc., Brooklyn, for a new method of manufacturing allethrin. The new process, covered in U. S. Patent 2,768,967, begins with an acetone dicarboxylic acid ester which Pfizer manufactures from citric acid.

Although Pfizer does not plan to produce the insecticide, company spokesmen believe that the new production route will be of interest to prospective licensees seeking either another source of starting material for the insecticide, or a possible future means of producing the material more economically.

New Stauffer Salesman

William A. Sikkel has joined the Agricultural Division of Stauffer Chemical Co., New York, as a salesman in the Midwest region. His territory includes Michigan, Western Ohio, and Northern Indiana.

A World War II army officer, Mr. Sikkel was connected with the Smith Agricultural Chemical Co. for seven years before joining Stauffer.

•

A.A.I. Convention Date Set

The Agricultural Ammonia Institute of America will hold its seventh annual convention in Little Rock., Ark., on Dec. 11, 12 and 13, 1957. Headquarters will be at the Hotel Marion, and convention sessions will be held at nearby Robinson Auditorium.

About 1,000 agricultural ammonia and farm implement dealers will join manufacturers for the three-day session. Attendance is expected from 40 states, Canada, Mexico, Cuba and Puerto Rico.

Hampton Pugh, cotton planter and fertilizer dealer of Tillar, Ark., who retired last year as a director of the Institute, will be convention chairman.

•

Climax Offers Molybdate

The Climax Molybdenum Co., New York, has announced that it is now supplying sodium molybdate, and has stocks available to meet the anticipated needs of fertilizer manufacturers, agricultural chemicals distributors, and other industrial consumers.

Applied to molydenum-deficient soils, sodium molybdate has contributed to increases in yields and improvement in quality of crops. The material, available as the crystalline technical grade, can be obtained directly from the company.

•

V-C Reports 6-Month Loss

The Virginia-Carolina Chemical Co., Richmond, Va., has reported a loss of $468,418 for the six months period ended Dec. 31, compared with a loss of $35,245 in the like period a year ago.

Knock out plant pests economically with

prentox pyronyl

Dust Concentrate

these are the facts:

1. Now, high concentrate of pyrethrum sold on *economical* basis!
2. Now, pyrethrum advantages incorporated with those of piperonyl butoxide!
3. Now, basic truck crop and home garden insecticide available at new low cost through addition of synergist to pyrethrum!
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PRENTISS pest-tested products you can count on:

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16th Annual Pacific Northwest Vegetable Insect Conference

by Charles Starker

1957 Officers Pacific Northwest Vegetable Insect Conference: D. G. Finlayson, Dominion Entomological Laboratory, Kamloops, B.C. co-chairman; J. R. Douglass, USDA, ERB, Twin Falls, Idaho, chairman; Howard E. Dorst, USDA, ARS, Logan Utah, secretary.

THE Imperial Hotel, Portland, Oregon, was the site of the 16th annual Pacific Northwest Vegetable Insect Conference, where federal, state and dominion entomologists from seven western states and provinces met January 21, 22, and 23rd. The 1957 chairman, J. R. Douglass, USDA, ERB, Twin Falls, Idaho, had charge of the open meeting, at which time and opportunity for questioning research men on various phases of their past season's work was provided.

Dr. Ed Klostermeyer of the Prosser, Washington Station was asked why an increase in net necrosis on tubers followed the application of Diazinon and Schradan for aphid control. His theory is that "initially these materials did a good job of control, and plants were relatively free, but check plots were heavily infested from inward migrations of aphids, had large populations of wingless forms, and as a result these plants became stunted and covered with honey dew, and produced constantly increasing aphid population. Incoming aphid migrants were repelled by the heavily infested plants in check plots and attracted to aphis-free plants in treated plots, fed there and transmitted the virus, causing net necrosis on netted gem tubers."

The answers to the question of state recommendations for aphis control on potato tubers varied with the state. In Idaho, no recommendations will be made for control of aphis on seed potatoes; Oregon will recommend parathion, or DDT and sulfur dust combinations; however in eastern Oregon this program is ineffective and not recommended. In western Washington growers in the seed producing area will continue with the same program used this past year, while in eastern Washington researchers will have to survey 1956 work before recommendations can be made.

Control of symphylids on perennial crops is a difficult proposition. Oregon workers have applied parathion through overhead sprinkling systems, and on certain crops favorable results have followed, but maximum protection does not exceed 90 days. Best program is to anticipate the pest before planting a perennial crop, and make a pre-plant fumigation with DD, ethylene dibromide, Vapam or Nemagon. Correct applications of these materials have given protection for a 2 to 3 year period, but soil conditions must be favorable for fumigation and proper application equipment used. Symphylids are

(*Turn to Page* 117)

Resistance Highlights Discussion at Western Spray Project

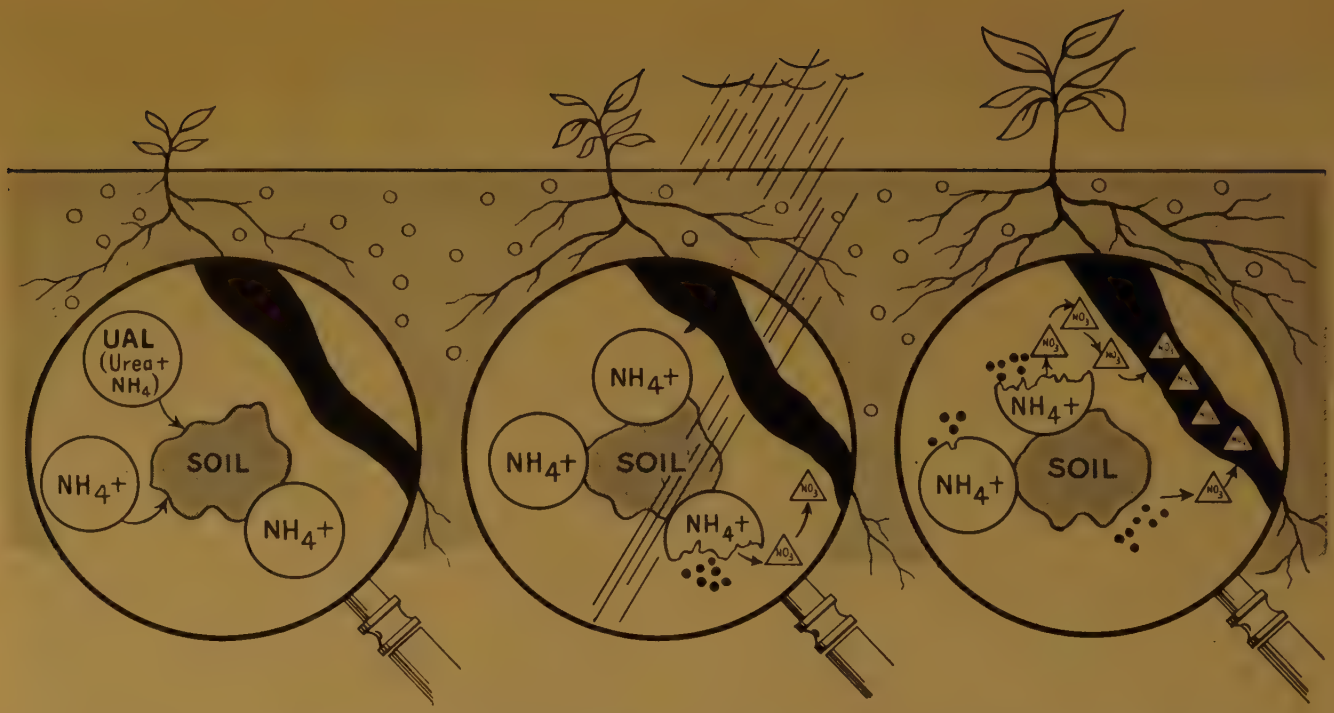
by Charles Starker

CONTROL of several major orchard pests has been more difficult in 1956 than in the past, entomologists and plant pathologists reported at the 31st annual meeting of the Western Cooperative Spray Project, held January 23-25, at the Imperial Hotel, Portland, Ore. In Yakima, USDA workers report definite resistance of codling moth to DDT. Control in that area has been much more difficult the past two years, with more growers reporting difficulty each year. At Hood River, Oregon, 3 covers of DDT still do an excellent job of control with no reported resistance. California workers have followed up several reported cases of resistance, but were unable to verify actual resistance.

The pear psylla is another pest which appears to give the growers in Yakima difficulty in control. A study of response of psylla to sprays at the Tree Fruit Stations at Wenatchee indicated that at present this insect is not resistant to phosphate materials currently used. Ovotran resistant mites which are also resistant to Genite 923 were reported from California. They may possibly also be

(*Turn to Page* 117)

1957 Officers Western Cooperative Spray Project: Anthony S. Horn, Univ. of Idaho Extension Service, Boise, secretary; H. F. Madsen, University of California, Berkeley, co-chairman; and George F. Knowlton, Utah State College, Logan, Utah, chairman.



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2. This ammonium nitrogen resists leaching. Nitrogen is made available to the plants when soil bacteria convert the ammonium nitrogen to nitrate nitrogen.

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Fertilizers ammoniated with Du Pont UAL have extra sales appeal because they are composed of two highly efficient forms of nitrogen. These forms—urea and ammonium—supply nitrogen that nourishes plants at the rate required for maximum growth and yields.

Nitrogen from Du Pont UAL resists leaching—remains in the root zone where plants readily absorb it. Thus, on the basis of units of nitrogen actually available to plants, UAL is a very economical investment.

Four formulations are available, including UAL 37—a special composition that releases nitrogen even more slowly. For technical assistance and information on the solution best suited to your use, write Du Pont.

Here are other important advantages of Du Pont URAMON® Ammonia Liquors:

- Safe in granulation . . . no danger of flash fires and less stack. Gives firm, uniform, stable granules, best for storage and application.
- Won't corrode regular fertilizer manufacturing equipment, including ordinary steel and aluminum.
- Gives mixed goods better "feel"—minimizes caking, segregation and dusting.
- Suitable for either batch or continuous mixing.
- Prompt, dependable delivery enables you to schedule your production with confidence.

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Rodgers Named SWC Head

The Southern Weed Conference, held in Augusta, Ga., Jan. 23 to 25, elected Dr. E. G. Rodgers, University of Florida, Gainesville, as their president for 1957. Dr. R. Behrens, Texas A&M College Station, Tex., was named vice-president.

A highlight of the conference was an address by Jack Dreessen, herbicide specialist for the National Agricultural Chemicals Assn., who told the conferees that chemical weed control is big business. Mr. Dreessen explained that more than 30 million acres of cropland in the U. S. will be chemically treated for control of weeds this year.

The conference set its meeting place for next year at the Peabody Hotel in Memphis, where it will meet jointly with the Weed Society of America. Meeting date will be Jan. 13 to 15, 1958.

•

Chipman Starts Expansion

Chipman Chemicals, Ltd., a firm owned jointly by Canadian Industries, Ltd., Montreal, and Chipman Chemical Co., Bound Brook, N. J., has started construction on a new laboratory building and warehouse beside its Hamilton, Ontario, plant. Completion is scheduled for April, 1957.

Besides laboratory and pilot plant facilities, the new building will contain office accommodations for the company's chief chemist who controls formulation of products at plants in Winnipeg, Moose Jaw, Buckingham, and Hamilton.

•

Emulsol Plans March Move

Emulsol Chemical Corp., Chicago, will move its sales and administrative offices to larger quarters at 75 East Wacker Drive. Emulsol's laboratory will remain at 59 E. Madison St. The move is planned for March 10.

•

WACA To Meet Apr. 2nd

The program for the spring meeting of Western Agricultural Chemicals Association in the Hotel Biltmore, Los Angeles, April 2, 1957 will feature T. A. Loomis, M. D., toxicologist, State of Washington and Associate Professor, School of Pharmacology, Washington University, Seattle, who will present his movie, slides and vocal presentation of "Effects of Anticholinesterase Insecticides on the Human." Mr. Ned Lewis, vice-president, Wilbur-Ellis Company, Los Angeles, will discuss "Some Economic Aspects of the Pesticides Industry," and a top scientist will discuss the outlook for improved pesticides.

Naugatuck Plans Expansion

Naugatuck Chemical division, United States Rubber Co., New York, is tripling laboratory and office space at its agricultural chemical research station and experimental farm in Bethany, Conn.

The new unit is expected to be completed by Spring. The additional floor space will be used for individual laboratories, a large conference room, and a library. A controlled temperature storage room will be added.

Four facts for users of absorbent clay

1 **Absorption qualities** of clay can be the cause of production problems and inferior product performance. High absorption qualities automatically assure smoother, more even results in grinding and impregnating all toxicants such as DDT, BHC, Malathion, Toxaphene and many others. Pikes Peak Absorbent Clays are selectively mined and carefully processed to guarantee the superior absorption necessary to maintain your quality production standards.

2 **Compatibility factor** has a direct bearing on the stability of your finished product or concentrate. Pikes Peak Absorbent Clay's pH of 5 delivers a compatibility factor *unequalled* by any other carrier or diluent.

3 **Grinding** requirements frequently differ, depending on the standards of the user. Your needs may vary from those of your competitors. Pikes Peak Absorbent Clay satisfies the basic need for extremely finely ground particles. *Ninety-five percent of every shipment is guaranteed to pass through 325 mesh.* Other sizes of Pikes Peak Clay are available to meet your specific needs.

4 **Service** is the vital factor in many clay purchases. You must have it when you need it. And you must have a source you can depend on to come through on tight schedules as well as during the lull seasons. Write us soon. Put us on the spot. Make us prove clay quality. Demand that we demonstrate what we mean when we say "with Pikes Peak Clay, you get service and quality you can depend on."

PIKES PEAK ABSORBENT CLAY

GENERAL REDUCTION COMPANY

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American Agriculture and Stauffer Grew Up Together

Many of the growers now feeding America are the sons and grandsons of men who used Stauffer Agricultural Chemicals more than seventy years ago. Today *both* American Agriculture and Stauffer are *big business* . . . both have long since outgrown knee pants.

Following the simple formula of *personalized, local service* Stauffer has grown to be the largest producer of agricultural chemicals in our nation, with manufacturing plants strategically situated in 48 locations from coast to coast. Fully staffed Stauffer Research Laboratories provide *local help to growers . . . devise local formulations for local problems!*

Take full advantage of the extensive Stauffer facilities. There is a Stauffer Technical Service Man in your area, working with your local dealer. Both are ready to help you.

Remember, it actually costs less to do business with the leader in the field.

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Stauffer CHEMICALS SINCE 1885

CIL Acquires Witts Works

The Witts Fertilizer Works, Ltd., Norwich, Ont., were recently purchased by the Agricultural Chemicals Division of Canadian Industries Ltd., Montreal. The Witts company, which produces compound fertilizers only, will be managed by Sam Cree.

•

Witchweed Quarantine

Agricultural representatives from North Carolina, South Carolina, and other states met with U. S. Department of Agriculture officials and other interested persons at a public hearing in Washington January 30 to discuss the need for a Federal quarantine against the parasitic plant known as witchweed, which causes a destructive disease of corn and certain other plants.

There was general agreement that the parasitic *Striga* plant, commonly called witchweed, is a serious crop pest, and that a joint Federal-State effort to eradicate it from infested areas in North Carolina should be undertaken. However, no decision has been reached as to whether a Federal quarantine should be imposed.

•

Louisiana Recommendations

The Louisiana Agricultural Experiment Station recently advised that the chlorinated hydrocarbon insecticides are not recommended for cotton in areas where boll weevils are resistant to them.

They suggest calcium arsenate dusts, or calcium arsenate alternated with combination of parathion, DDT, Guthion, malathion, in various rates per acre.

•

Weevil Hibernation Down

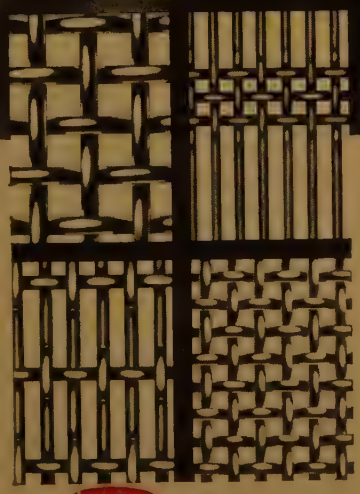
Woods trash near cotton fields shelters fewer boll weevils this winter than last in several leading cotton-growing states, but hibernating weevils are still numerous enough to cause early-season trouble, the U. S. Department of Agriculture reports. In Louisiana, Mississippi, South Carolina, Arkansas, and parts of North Carolina, boll-weevil numbers surveyed last fall were below the very high counts of the previous year. However, weather conditions favorable to development of this perennial cotton pest might still bring out damaging numbers this spring. Counts in Virginia, Tennessee, and Georgia were higher than in the fall of 1955 but comparable to those in the other states.

To gauge the size of the upcoming boll-weevil problem, cotton growers watch the surveys made each year by cooperating entomologists of the State agricultural experiment stations and USDA's Agricultural Research Service. A final survey will be made in the spring of live weevils that survive the winter.

Fertilizer Content Raised

A new grade of Ammo-Phos pelletized fertilizer, 8-32-16, is being introduced to Midwest farmers this spring by the plant food division of the Olin Mathieson Chemical Corp.

The 1-4-2 ratio fertilizer, suitable for many of the farm crops in the Midwest, until now has been available only in such grades as 5-20-10 and 6-24-12. Olin Mathieson anticipates that the higher analysis will be well received by farmers because it reduces the amount of filler.



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Naval Stores Department
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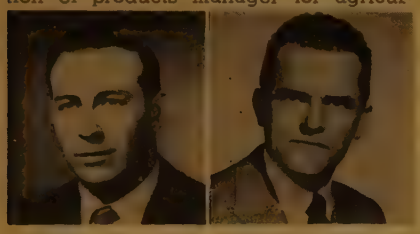
Frontier Names Two

Frontier Chemical Co., Wichita, Kans., has appointed Frank Maxey to the position of products manager for agricul-



W. R. Pierre F. Maxey

tural chemicals. His headquarters are in Frontier's Wichita offices. W. R. Pierre, former sales coordinator, has replaced Mr. Maxey as sales representative in the Dallas, Tex., area.

The appointments coincide with increased agricultural chemicals production at the Wichita plant. Frontier has contracted to deliver both 36 gamma technical and 13 to 15 gamma benzene hexachloride during the 1957 season.

•

Chemical Construction Up

The chemical industry will spend an estimated $2.5 billion on new domestic chemical construction through 1957 and 1958 according to a survey conducted by the Manufacturing Chemists' Association, Inc., Washington, D. C. The projects are being carried out by 327 privately financed companies in 44 states.

•

Cyanamid Appoints Kirkland

Robert O. Kirkland has been appointed manager of technical services for insecticides for the Phosphates and Nitrogen Division, American Cyanamid Co., New York.

Mr. Kirkland provides technical advice and services for formulators who use Cyanamid insecticides. He also assists formulators in developing new formulations and introducing new products.

•

TGS Mexico Plant Produces

Texas Gulf Sulphur Co.'s Mexican affiliate—Compania Exploradora del Istmo, S. A.—has begun production of sulfur with its recently completed Frasch system extraction plant at Nopalapa, State of Veracruz, on the Isthmus of Tehuantepec in southern Mexico.

Operation of the plant follows seven years of exploration and development in the southern Mexico jungles by the Texas Gulf affiliate. After location of the sulfur deposits and construction of the plant site, the world's first sea-going extraction plant was built in this country and towed to the Coachapa River, where the mine is located.

Initial production at the plant has been limited and capacity production is expected to be achieved shortly. The plant and sulfur deposits are located in an area of about 13,000 acres.

Fulton Names Two Managers

Fulton Bag & Cotton Mills, New Orleans, La., has appointed new managers for two of the company's manufacturing branches. E. Monroe Hornsby has assumed the post of manager, Mid-States branch, and Kenneth H. Kerr is heading the Denver, Colo., branch.

Gibberellic Acid, A New Plant Growth Stimulant

THE availability of the new plant-growth stimulating gibberellic acid, has been announced by S. B. Penick & Co., New York, and by Merck & Co., Rahway, N.J., (Merck's product will be sold as "Gibrel"). Initial work indicates that on certain flowers and ornamentals, gibberellic acid will stimulate stem length and lateral growth, accelerate stem growth on cuttings, increase profusion of blooms, stimulate earlier blooming, promote flowering of plants tending to remain in the vegetative stage, and induce flowering of biennials in the first year. Favorably affected were such plants, shrubs and trees as African violet, begonia, Boston ivy, dahlia, geranium, holly, hydrangea, juniper, red-leaf Japanese maple, petunia, Virginia pine, poinsettia, and salvia.

Gibberellic acid was isolated by Japanese scientists working on the prevention of a rice disease. Further work by U. S. agricultural scientists indicated that in only three to four weeks plants treated with the chemical grew three times as tall as comparable untreated plants.

It is expected that small package products incorporating gibberellic acid will be made available to the home garden market this spring.

Gibrel will be marketed immediately by Merck in the potassium salt form of gibberellic acid to formulator distributors on a nationwide basis. They report, however, that further research will be necessary before use of this new material on food crops can be recommended. Preliminary results indicate that the product may have far-reaching and economically important effects on such crops. It is claimed to stimulate certain plants to grow four times faster, and to break dormancy, form flowers, set fruit, and produce seeds weeks and months ahead of normal schedule.

Recent test work with the potassium salt of gibberellic acid (Gibrel) indicates increases in fruit per tomato plant, larger celery stalks, and a general boost in flower growth. Investigators add further that Gibrel has shown beneficial results in other ways, particularly to commercial seedsmen and truck farmers,—enabling carrots to produce flowers in six months, and to cause head lettuce to by-pass the head stage, growing it directly to seed.

Research in greenhouses and under actual large scale growing conditions is continuing at an increasing pace to more fully determine the potentional benefits of gibberellic acid.

Both African Violet (Pink Cloud) plants pictured at left were planted at the same time. The plant growth stimulator called 'Gibrel' was used on plant at left. The photo was taken 6 weeks after treatment.

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easier to use
costs less to process

YOU GET A HARD, CLEAN, STABLE POWDER when you specify Pestmaster Technical Grade DDT. Formulators know from experience that it costs less to grind powdered Pestmaster DDT than DDT in flake form. This cost differential means extra profit for you . . . and the quality of Pestmaster is high. It will add stability and uniformity to your formulations.

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Monsanto Appoints Pullen

Edward R. Pullen has been appointed northwestern sales representative for the farm chemicals marketed by Monsanto Chemical Company's Organic Chemicals Division at St. Louis. Operating from offices in Portland, Ore., he will be responsible for Monsanto's farm chemicals distribution in the four-state area of Oregon, Washington, Idaho and Montana.

•

Heads Calif. Weed Assoc.

California Weed Conference members meeting at Fresno named Dr. Vernon I. Cheadle of Davis as their new president. Dr. Cheadle head of the botany department, University of California, Davis, succeeds James W. Koehler of Pomona, California Department of Agriculture official.

Other officers elected include J. T. Vedder, Hanford, Sunland Industries, Inc. vice-president; Dr. Oliver Al Leonard, University of California, Davis, botanist, secretary; and Bruce Wade of Redding, Shasta County Agricultural Commissioner, treasurer.

An all-time record of 600 attendance was made at the opening session of the three-day meeting.

Future meeting dates for the conference are as follows — San Jose, January 21, 22, and 23, 1958; Santa Barbara, January 20, 21, and 22, 1959; Sacramento in 1960; and Fresno in 1961.

•

Western Cotton Conf. Mar. 4

The 1957 Western Production Conference in Phoenix, Ariz., March 4 and 5 will be an analysis of the current cotton situation, the nature of cotton's competition, and the role of quality improvement and cost reduction in meeting that competition.

A session on post-harvest and pre-planting measures for controlling insects and diseases will feature the second day's program. K. P. Ewing, Cotton Insects Section, USDA, Beltsville, Md., will discuss insect control and Dr. John T. Presley, plant pathologist in the cotton crops section of the Beltsville station, will talk on disease control.

The conference is sponsored by the Southwest Five-State Cotton Growers Assn. and the National Cotton Council. Local host is the Arizona Cotton Growers Assn.

•

Texas Co. Appoints Hays

The Texas Co., New York, has appointed Lee R. Hays to represent the company in the mid-west in selling Texaco anhydrous ammonia and nitrogen solutions. Texaco is presently constructing an ammonia and nitrogen solutions plant at Lockport, Ill.

New D-O Pump Distributors

Dorr-Oliver, Inc., Stamford, Conn., has announced the appointment of Kerr Machinery Co. of Detroit, Mich., and Shutt Process Equipment Corp., of St. Louis, Mo., as distributors for industrial and process pumps. Both organizations will be exclusive distributors in their respective areas and will stock, market and service a complete line of D-O pumps and spare parts for the chemical, metallurgical and general industrial fields.

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PACKAGE YOUR PRODUCT IN THIS

Well Located Plant

SAVE COSTS at This EXCELLENT Midwestern Location!

- **Sturdy Brick, Cement Filled Steel Beam Construction.**
- **Buildings in Well Maintained Condition.**

LOCATION . . . LA CROSSE, WISCONSIN

This fine plant, formerly a brewery, has over 600,000 gallons of steel tank capacity. All tanks, piping, lines, etc., are intact.

It is located **only 200 yards** from a Mississippi River Barge terminal. A pipe line can carry liquid direct from barge to our storage tanks. Tank barges have capacities from 315,000 to 840,000 gallons.

It also has three steel cylindrical dry storage tanks complete with dry bulk loading and unloading equipment. Dry storage tanks have capacity of 15,000 bushels. Hopper scales, etc., are intact.

Dry bulk materials can be loaded direct from rail cars to dry storage tanks.

This plant has many other advantages — parking facilities, deep water well, etc.

The plant is ideal in construction and location for receiving bulk materials via barge or tank car (at low cost) and as a packaging and distribution center.

LA CROSSE, WISCONSIN: **A beautiful aggressive city of 50,000 in the Mississippi Valley . . . highly industrialized. In the heart of a prosperous farm and dairy region. Wonderful business and recreational facilities. Located 140 miles from the Twin Cities, 200 miles from Milwaukee, and 300 miles from Chicago.**

TRANSPORTATION:

1. **Mississippi River barge terminal only a few seconds from this plant.**
2. **A railroad siding serves all buildings.**
3. **La Crosse served by three railroads, Milwaukee Road, C. B. & Q., and Chicago and North Western.**
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5. **Excellent overnight trucking service to all Midwestern points.**

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LA CROSSE, WISCONSIN

CAC Meets In Denver

The Colorado Agricultural Chemicals Assn. convened at the Cosmopolitan Hotel in Denver for their sixth annual meeting on Jan. 25. Irwin C. Elliott, district sales representative, Chem-Agro Chemicals Corp., Denver, was elected president to succeed Howard M. Lair of Selco Supply Co., Eaton, Colo.

Other officers elected at the meeting were: Frank J. Randall, C. D. Smith Co., Grand Junction, Colo., vice president; and H. C. Hansen, General Chemical Div., Denver, secretary-treasurer.

D. L. Paterson of Boettcher & Co., talking about business in 1957, told the members that sales in many chemical fields should double in the next five years. He stated that business looks good for the 1957 season in most fields. Industry is expanding, he explained, and many of the chemical companies are entering into this year with plant expansions worth millions of dollars.

Speaking for the Food and Drug Administration, R. L. Horst discussed the administration's interest in assisting in the keeping of pesticide residues below the announced tolerances.

A highlight of the convention was the meeting of the association's clearing committee under the chairmanship of Paul W. Swisher, commissioner of agriculture for the state of Colorado. Representatives of the various departments of Colorado A & M College discussed the pesticide recommendations for 1957.

Reports were heard on new uses for chemicals which had been developed during the past year as well as new chemical discoveries. Dieldrin was recommended for roach control and a new item is chlorobenzilate for control of mites. Reports on fungicides and herbicides disclosed promising results of studies during 1956 and told of projects for 1957. Discussions during the clearing committee meeting enabled the manufacturers, distributors, and dealers present to get detailed information on the pests and pesticides applicable to their individual areas.

During the business meeting, special emphasis was placed on label education and the importance of the pesticide user's thorough understanding of directions and instructions for the use of the pesticide.

New officers for the Colorado Agricultural Chemicals Assn. are, from left to right, Irwin C. Elliott, president, H. C. Hansen, secretary-treasurer, and Frank J. Randall, vice president.

FOR DUST FORMULATORS ONLY

The leaf shown above is infested with aphids. These tiny sap-sucking insects seldom move more than a few inches a day. This sluggishness and their manner of feeding require the deposition of a contact insecticide *on* these hard-to-kill insects. Coverage of the entire plant surface is necessary for adequate control.

The characteristics of any dust reflect the quality of the diluent used. Most dusts have less than 20% toxicant; the remainder is an inert diluent with which the toxicant must be in intimate contact for maximum effectiveness.

PYRAX ABB, the most compatible diluent with workable bulk density, imparts flow and anti-caking properties to dust mixes. **PYRAX ABB** promotes electrostatic dispersion of the dust cloud, assuring coverage of the entire plant surface.

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*Trade Mark

Southwest Potash Corporation

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Federal Chem. Sales Meet

The Federal Chemical Co., Louisville, Ky., held its general sales meeting Jan. 10 and 11 to introduce the 1957 promotion of Federal Graduated Fertilizer, a recent development by the company.

The firm serves a territory covering Kentucky, Tennessee, Ohio, Indiana, Illinois, and parts of Alabama, Mississippi, Missouri, Michigan, and Wisconsin.

•

Strawberry Fungi Discussed

Patrick M. Miller, plant pathologist at the Connecticut Agricultural Experiment Station, New Haven, discussed several causes of blackened roots on strawberries at the January meeting of the Massachusetts Pomological Society in Worcester.

Several different fungi are the most common causes of black root, Dr. Miller reported, and an effective fungicidal treatment of the soil, with such fungicides as oxyquinoline sulfate, usually gives control. Among other causes of black root are nematodes, injury to runner plants before planting, and low soil temperatures.

Dr. Miller also mentioned his research on control of grey mold of strawberries. Excellent control was obtained experimentally with three sprays of either thiram or dichlone. Dr. Miller stressed, however, that neither fungicide should be used by growers until the materials have been cleared by the U. S. D. A. for use on strawberries.

•

Geigy Names Florida Agents

Geigy Agricultural Chemicals division of Geigy Chemical Corp., Ardsley, N. Y., has appointed Ashcraft-Wilkinson Co., Atlanta, Ga., as sales agents in Florida for Geigy's sequestrene iron chelates.

Geigy will continue to maintain stocks in Orlando and Tampa, Fla.

•

CFA Slates November Meet

The thirty-fourth annual convention of the California Fertilizer Assn. will be held at the St. Francis Hotel, San Francisco, on Nov. 3, 4 and 5, 1957.

L. J. Polite

Diamond Names Polite

The Diamond Alkali Co., Cleveland, has appointed L. J. Polite, Jr. sales manager for the company's Chlorinated Products Division.

Sales manager for certain major Diamond organic chemicals during the past year, Mr. Polite now holds overall sales responsibility for the complete, diversified line of chlorinated products manufactured by the company at plants at Painesville, O., Deer Park and Greens Bayou, Texas, Newark, N. J., and Belle, W. Va. These include agricultural chemicals, chlorinated solvents, organic intermediates, acids, and Chlorowax (a chlorinated paraffin).

•

Concrete Fertilizer Plant

A new fertilizer plant, representing a unique departure in design and construction, started production near Fairfax, Minn., last month. Built for the International Minerals and Chemical Corp., Chicago, the plant is said to be the first fertilizer plant in the U. S. to be constructed entirely of pre-cast concrete.

The single-story structure provides 10,000 square feet of storage space and 4,000 square feet of manufacturing area. E. P. Ruszat, formerly plant superintendent of the company's Mason City, Iowa, plant, is operating the Fairfax plant.

•

Spray Fertilizer Hailed

The use of a new liquid spray-on fertilizer may be of tremendous value in production of tobacco and some vegetables in the Georgia area, according to W. D. Wilner, Miller Chemical Co., Baltimore.

Speaking at the "Fertilizing Soils for Profit" course given by Abraham Baldwin Agricultural College, Tifton, Ga., and the Georgia Coastal Plain Experiment Station, Mr. Wilner reminded his audience that plants receive a shock when they undergo transplanting. He said that the liquid chemical will serve as a stimulant after plant removal. The chemical, produced by Miller under the name of Nutri-leaf, is sprayed on the leaves.

Frank Boyd of the Virginia-Carolina Chemical Co., Richmond, Va., who also spoke at the course, pointed out that $50 million worth of fertilizer is being used in Georgia every year but that all crops, except possibly tobacco, could use more.

•

Kansas Pesticide Meeting

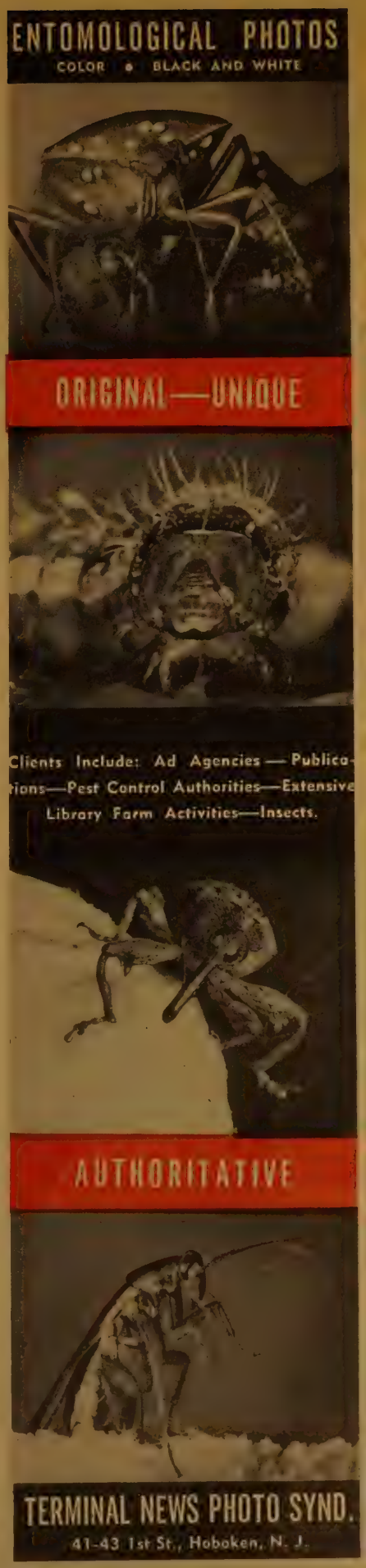
The first Kansas Pesticide Dealer and Custom Applicator conference was held at Kansas State College, Manhattan, Kans., on Feb. 26. Chris C. Burkhardt of the Kansas State entomology department was chairman for the conference which discussed some of the latest research in pesticides.

R. V. Olson, head of the K-State agronomy department, presided at the morning session and Herbert Knutson, head of the entomology department, conducted the afternoon meeting. Speakers encouraged the proper use of pesticides and discussed the 1957 weed and insect control recommendations.

•

New Atlas Technical Center

Architect's drawing shows the new Technical Center of the Atlas Powder Co., Wilmington, Del., for which ground was broken in Jan. The center is located next to the company's general offices in suburban Wilmington.



Cotton States Branch, E.S.A., Elects Allen Chairman

THE Cotton States Branch of the Entomological Society of America elected new officers at the close of its thirty-first annual meeting in Birmingham, Alabama, on February 4, 5, and 6. Norman Allen of Florence, South Carolina, became chairman; Dr. Charles G. Lincoln, Fayetteville, Arkansas, was elected to the position of chairman-elect; Dr. M. E. Merkl of Leland, Mississippi, was elected to a three-year term as secretary-treasurer to succeed W. G. Eden of Auburn, Alabama. Elected as members of the executive committee for one year were H. S. Mayeux of Jacksonville, Florida, and J. K. Reed of Clemson, South Carolina.

One hundred sixty-five persons registered for the three-day meeting which was held in the Dinkler-Tutwiler Hotel. A total of 82 papers was given at the meeting. Included were invitational papers by Frank Holland, Florida Agricultural Research Institute and Dr. J. S. Roussel of the Louisiana Agricultural Experiment Station. A symposium on "Recent Insect Invaders" included discussions on the European corn borer by W. G. Eden, Alabama Agricultural Experiment Station; the pepper maggot by C. R. Jordan of the Georgia Agricultural Extension Service; the white-fringed beetles by H. C. Young, U. S. D. A.; and the Mediterranean fruit fly by G. G. Rohwer, U.S.D.A. Other papers covered a wide variety of research work being carried on within the Cotton States Branch.

Other items of particular interest at the meeting included an address by Dr. H. M. Armitage of Sacramento, California, president of the Entomological Society of America. Distinguished visitors included Dr. R. H. Nelson, executive secretary of the E.S.A. and Dr. F. W. Poos, editor of the *Journal of Economic Entomology*. The Branch officially adopted a constitution and by-laws which had been prepared by a committee headed by Dr. J. H. Cochran of Clemson, South Carolina.

The program commitee for the meeting included Hamilton Laudani of Savannah, Georgia, V. M. Kirk of Florence, South Carolina, H. E. Scott of Raleigh, North Carolina, J. E. Ziegler of Millbrook, Alabama, J. W. Wilson of Sanford, Florida, and L. C. Murphree, Starkville, Mississippi, Chairman.

In charge of local arrangements for the meeting were N. R. Downey of Birmingham, J. E. Ziegler of Millbrook, and G. R. Williamson, Montgomery, Chairman.

•

Ethylene Dibromide Residues

The Commissioner of Foods and Drugs reports a request that tolerances of 10 ppm be established for residues of inorganic bromides on the following commodities that have been fumigated with ethylene dibromide in accordance with the Mediterranean Fruit Fly Control Program: bitter melon, beans, cantaloupe, bananas, citrus fruits, cucumbers, guavas, litchi nuts, mangoes, papayas, peppers, pineapples, squash.

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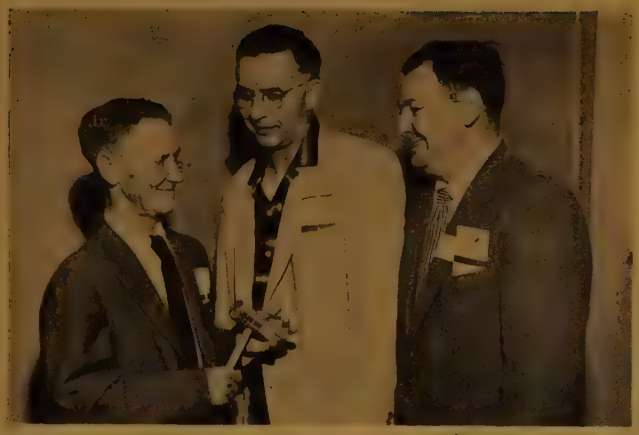


Officers for Cotton States Branch ESA: (l to r) chairman, Norman Allen; vice chairman, C. G. Lincoln; and secretary-treasurer, M. E. Merkl.

Crush Medfly In 2 Counties

Restrictions affecting the interstate movement of fruits, vegetables, and other articles regulated under the Mediterranean fruit fly quarantine have been revoked in Colliar and Hendry Counties, Florida. Only four Florida counties now remain under regulations, according to the USDA. They are: Broward, Dade, Lee, and Pinellas. Eradication of the Medfly was accomplished largely by airplane-applied poison bait sprays.

USDA Advance on '54 Census

The advance report on the 1954 Census of Manufactures gives the following figures on 1954 production of the following insecticidal materials in thousand pounds:

lead arsenate	15,648
calcium arsenate	2,758
other arsenicals	14,029
sulfur preparations	313,005
rotenone insecticides	16,060
BHC preparations (no DDT, but including lindane)	60,525
Chlorinated hydrocarbons	122,502

•

Special NAC Safety Issue

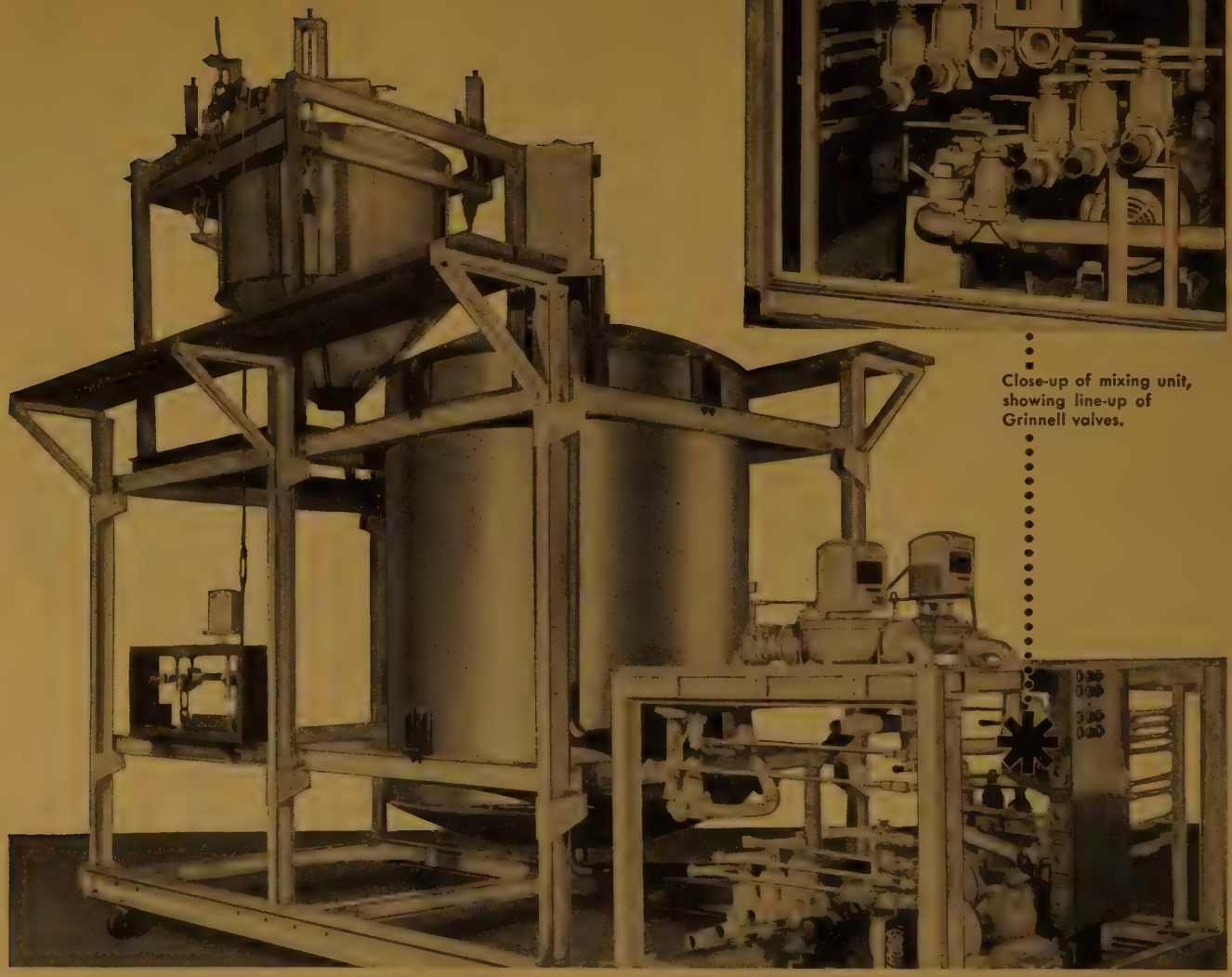
The NAC News and Pesticide Review, the official publication of the National Agricultural Chemicals Assn., Wash., D. C., presented a special safety issue in January containing the experiences and observations of a variety of experts in the fields of safety and public health.

The safety issue is the first of several special issues which will be published this year. It contains articles such as: safety tips for using pesticides, safeguarding public health, safeguarding food supplies, and chemical life savers.

•

Award Potash Shaft Contract

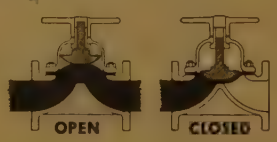
Farm Chemical Resources Development Corp., Carlsbad, N. M., has awarded a contract to MacKenzie and Whittle for design and construction of a shaft for its potash mine near Carlsbad. Farm Chemical Resources is owned and operated by the National Farmers Union of Denver, Kerr-McGee Oil Industries, Oklahoma City, and Phillips Petroleum Co., Bartlesville, Okla.



Close-up of mixing unit, showing line-up of Grinnell valves.

Liquid Fertilizer Mixing Plant Relies on GRINNELL-SAUNDERS DIAPHRAGM VALVES

As original equipment on Standard Steel Mfg. Co.'s efficient liquid fertilizer mixing plant are 14 quick-acting Grinnell-Saunders Diaphragm Valves. The choice of these valves was dictated by a number of important considerations. The quick shut-off feature of the ¼-turn Grinnell-Saunders valve was one. But most persuasive was the design principle of this diaphragm valve. The diaphragm of the Grinnell-Saunders valve absolutely isolates operating mechanism from corrosive fluid in the line. This resilient diaphragm assures leakproof closure, even if grit or scale are in the line. Maintenance, too, is simple. The diaphragm may be replaced without removing the valve from the line. No refacing or reseating is necessary.



Bodies are of cast iron (plain or rubber lined), aluminum, stainless steel; diaphragms are of rubber, neoprene, or other synthetics. For further facts, write Grinnell Company, Inc., 235 West Exchange St., Providence, Rhode Island. Branches in principal cities.

GRINNELL-SAUNDERS DIAPHRAGM VALVES

Equipment, Supplies, Bulletins

Test Urea-Form For Pines

Preliminary results of tests conducted by the Agricultural Experiment Station of the Alabama Polytechnic Institute, Auburn, Ala., indicate that it is feasible to use a single application of urea-formaldehyde for loblolly pine seedlings in the nursery.

Repeated nitrogen topdressing of pine seedlings is standard practice in forest nurseries, but seedlings treated with the single urea-formaldehyde application during 1955 reached heights equal to seedlings grown with repeated topdressings of ammonium nitrate.

Results of the tests have been published in Progress Report Series No. 65 by the Alabama station.

Hudson Foil-Wall Sack

A multiwall sack featuring aluminum foil laminated to kraft paper has been introduced by Hudson Pulp & Paper Co., New York, as a standard part of its multiwall line. It is being marketed on a regular order basis under the name "Foil-Wall."

The foil barrier, made of ALCOA aluminum, offers moisture vapor protection and odor and gas resistance.

Seed Inspection Device

A simple device for determining insect damage to seeds is described in U. S. D. A. publication ARS-33-35, dated Dec., 1956. The device consists of a pane of glass, a mirror, and two lamps. Putting the seeds on the glass, which has been placed on five inch legs and placing the mirror beneath the glass, both sides of the seeds are visible at once. The two lamps are adjusted to give maximum light and a minimum of shadow.

This method has been used at the Twin Falls, Idaho, field station for the last three years to determine the percentage of "chewed" beans in samples taken from chemically treated plots in tests for the control of the western bean cutworm.

Two Pennsalt Bulletins

The I. P. Thomas Division of Pennsalt Chemicals, Philadelphia, is offering two new bulletins for farmers in New York, New Jersey, Pennsylvania, and Delaware. The bulletins explain how to get full value from farm manures and how to overcome soil acidity.

Information on liming tells what kinds, how much, and when to apply lime for the most beneficial results in overcoming acidity. An easy reference table gives the various types of lime and compares their effectiveness.

Fertilizer Guides Due

The National Joint Committee on Fertilizer Application is publishing up-to-date guides on correct placement of fertilizer in cotton production. The placement guides were developed by a special cotton subcommittee composed of agronomists and engineers from land grant colleges and are designed for use by manufacturers of fertilizer and fertilizer placement machinery. The guides are useful also to research workers who are seeking improved fertilizer placement techniques.

Hoke Pressure Regulator

Hoke, Inc., Englewood, N. J., is offering a new line pressure regulator wtih a built-in relief mechanism that automatically relieves a build-up of back pressure. Called the 660 Series, the regulators have O-ring seats that provide absolute shut-off.

New Protective Coating

West Chester Chemical Co., West Chester, Pa., has introduced a new coating which provides protection against chemical and weather exposure. The new product, called "Maintz," is based on duPont's chlorosulfonated polyethylene and may be applied on metals, wood, concrete, masonry, cloth, and even other elastomers .

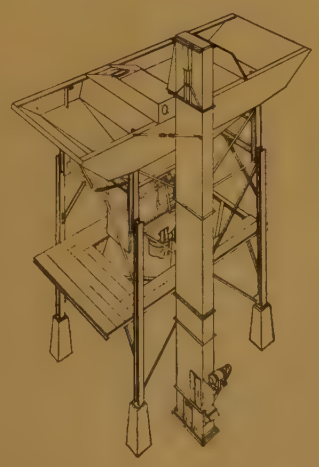
New Emcol For Aerosols

Emulsol Chemical Corp., Chicago, has developed a new emulsifier, Emcol 14, which is expected to permit aerosol packaging of many new products. The company explains that emulsion formulations using flourinated hydrocarbon propellants with Emcol 14 create desirable sprays with minimum foaming and container corrosion.

Full details are available in Emulsol's technical bulletin No. 49.

New Johnson Batching Unit

The Johnson "Econoplant" batching setup is a complete plant facility recently developed by C. S.



Johnson Co., Champaign, Ill., a subsidiary of the Koehring Co., Milwaukee. As a basic plant the Econoplant has three aggregate compartments of 45 cu. yds. total heaped capacity and one 70 bbl. cement compartment. It is designed with large top openings to make clamshell charging practicable.

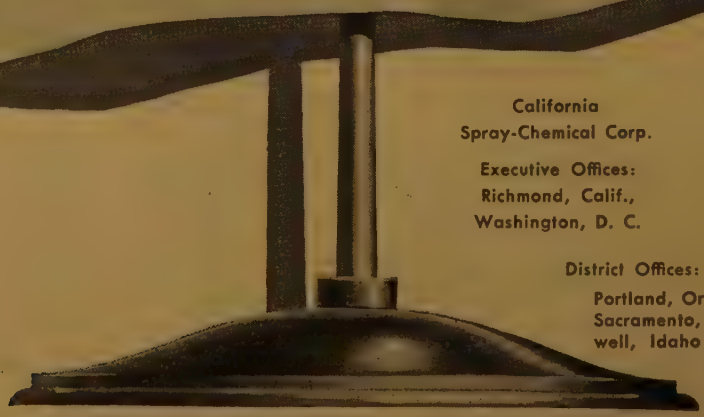
Easily erected and convenient in operation, the Econoplant has a built-in ¾ h.p. air compressor to supply air for cement aeration.

ORTHO *lindane*

GIVES YOU ALL THESE ADVANTAGES:

- ✓ High efficiency factor
- ✓ Excellent control of wide variety of insects
- ✓ Ease of formulation
- ✓ 100% gamma isomer
- ✓ Combines effectiveness with economy

On all chemicals, read directions and cautions before use.



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Pyrenone Facts Folder

The Fairfield Chemical Division of Food Machinery and Chemical Corp., New York, has issued a "reference file on condensed product and end-use data for formulators of all types of insecticides" called the Pyrenone Facts Folder.

Intended as a permanent type file folder, the booklet contains basic information on typical Pyrenone formulations. The folder, bound with a coated, highly glossy cover, presents technical subject matter in language that can be easily understood by the formulator.

Chapter titles include: Resistant Insects, Household Products, Dairy Sprays, Garden and Truck Crop Insecticides, and Food Handling and Processing.

•

Garden Spray Attachment

Bete Fog Nozzle, Inc., Greenfield, Mass., has developed a "Mister-mix" unit which they say applies any type of emulsion or concentrated liquid in either mist or jet stream form. The unit is attached to an ordinary garden hose and mixing action is controlled by a thumb hole on the top.

•

Linck Lawn Care Booklet

O. E. Linck Co., Inc., Clifton, N. J., has issued a booklet describing their new Linck's Liquid Spreader which is designed for use on home lawns, applying liquid lawn chemicals such as fertilizers, fungicides, and weed killers.

Patterned after the hand lawnmower, the spreader can cover up to 1,000 square feet in three minutes. Directions for mixing chemicals are printed on the top of the spreader's tank.

•

Fertilizer Ratio Leaflet

A leaflet explaining the importance of heeding the grade numbers when purchasing fertilizer has been issued by the Agricultural Experiment Station of the Alabama Polytechnic Institute, Auburn, Ala. Directed to the consumer, the leaflet points out that buying fertilizers according to crop needs is good business, and recommends soil tests for every farmer to determine the kind and amount of fertilizer needed.

The leaflet, No. 51, is titled: "It's What Is In The Bag That Counts."

•

Booklet Describes Crushers

The American Pulverizer Co., St. Louis, has issued a bulletin describing the American laboratory crushers which are utilized in crushing laboratory samples of all types of materials, including chemicals. Capacities of the crushers described range from 600 to 2,000 pounds per hour. The illustrated booklet, Bulletin 157, may be obtained from the company.

•

Woodbury Growth Continues

Woodbury Chemical Co., St. Joseph, Mo., has purchased the buildings and property of the Brancucci Chemical Co., Denver, Colo. Last March, Woodbury purchased the Export Chemical Co. of Colorado and in the summer of 1956, they purchased the Geigy Co.'s McGregor, Tex., dust plant for installation in Denver. Leonard Everett has been placed in charge of the entire Denver operation.

A manufacturer of aldrin and various DDT products, Woodbury has also opened a new office in Coral Gables, Fla.

•

Bagpak Plans New Plant

Bagpak Division of the International Paper Co., New York, will begin construction work on a new multiwall paper shipping sack plant at Litchfield, Ill., in the spring.

•

New Sprout-Waldron Mills

Sprout-Waldron and Co., Inc., Muncy, Pa., has announced the production of a new line of roller mills which incorporates an easy method of controlling and adjusting the rolls.

A one-point spring loaded roll control system consists of a hand lever which activates an eccentric mounted shaft and provides instant, individual throw-out of each pair of rolls. The new mill is available in one, two, and three pair high units.

Armour Arquad Booklet

Armour and Co., Chicago, has issued an illustrated booklet describing the quaternary ammonium salts made by the company's chemical division and trade named Arquads. One of the many uses for the salts is as an emulsifier for insecticides.

Arquad 2C, combined with Ethofat 142/20, is being used for Lindane, Toxaphene, DDT, and Chlordane concentrates.

•

Garden Hose Sprayer

Sprayers & Nozzles, St. Petersburg, Fla., are offering a garden hose sprayer for applying insecticides, fungicides and soluble plant foods. The container holds about three gallons, retails for $2.99.

•

Gro-Green Fertilizer Solution

H. D. Campbell Co., Rochelle, Ill., are offering their liquid fertilizers "Gro-Green," and "Foliage Dietene" to commercial growers in 30 and 35 gallon drums.

The firm announces it is also formulating several fertilizers of varying analysis, containing trace elements, hormones, etc., to fit soil requirements in different areas.

•

Michigan's on the Move

A 2-color, 8-page booklet illustrates various trucking, materials handling and moving operations using the tractor shovels. The booklet is published by the Construction Machinery Division of Clark Equipment Co., Battle Creek, Mich.

•

FMC's Methallyl Chloride

Methallyl chloride is now being offered commercially by Food Machinery and Chemical Corp.'s recently formed Organic Chemicals Division. The material is used in the synthesis of insecticides, fungicides, fumigants and pharmaceuticals.

•

Richardson Bagging Model

Richardson Scale Co., Clifton, N. J., report that test weighings on their new fertilizer scale, HA-39, have passed the one million mark, with no mechanical or electrical failure. Completely automatic, the scale has been unattended during most of the testing.

VULCAN®

. . . a carton or carload, **Vulcan** ships fast."

. . . size is no problem, **Vulcan** makes 1 through 15 gallons."

. . . and **HiBake** interior linings for product protection."

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See "Pails" in Classified Phone Directories

BREVITIES

JOHN B. GAY has been appointed plant manager of the Vernon, Calif. plant of the Stauffer Chemical Co., New York. Mr. Gay succeeds H. L. Herkelrath who, for reasons of health, has asked to be relieved of some of his responsibilities, but still remains as staff assistant to the plant manager.

AC

CAMPBELL FERTILIZER CO., INC., Gueyden, La., distributing, retailing, and wholesaling fertilizers, has been granted a charter of incorporation The company listed its capital stock at $15,000.

AC

BYRON A. MCKINNEY, former auditor-in-chief of the F. S. Royster Guano Co., Norfolk, Va., died recently in Scottsburg, Va., following a brief illness. He was 75 years of age.

AC

THE BORDEN CO., New York, has named James A. Wold to the position of general manager for the newly-created Consumer Products Department of the company's Chemical Division. Among the products manufactured by the Chemical Division is a nitrogen fertilizer.

AC

WALTER A. BAUER has been named manager of commercial solvents in the St. Louis industrial chemicals district of Commercial Solvents Corp., New York. Mr. Bauer will direct sales operations in the Mid-West.

AC

EASTMAN CHEMICAL PRODUCTS, INC., N. Y., a subsidiary of Eastman Kodak Co., has expanded its line of feed-grade antioxidants to include a premix containing 25% BHT (butylated hydroxytoluene). Designated 25% Tenox BHT Premix, the new formulation is comprised of one part BHT and three parts of a nutritive cereal carrier.

AC

DIAMOND ALKALI CO., Cleveland, has reported that sales of agricultural and industrial chemicals in 1956 climbed to their highest level for the fifth successive year, reaching approximately $121,250,000. This represents an increase of ten per cent above the 1955 total.

AC

DR. JOSEPH D. CAMPBELL has been appointed agronomist for the north central district of the Plant Food division, Olin Mathieson Chemical Corp., New York. His headquarters will be in Omaha, Nebr.

AC

ROBERT G. HICKLE has been appointed assistant manager of agricultural chemical sales for Brea Chemicals, Inc., Los Angeles, a subsidiary of Union Oil Co. of California.

AC

DR. BAILEY B. PEPPER, secretary of the New Jersey Mosquito Extermination Association, has announced that the printed proceedings of the association's 43rd annual meeting are ready for distribution. Copies may be obtained from the Department of Entomology, Rutgers University, New Brunswick, N. J.

AC

JACK HYLAND, Chicago manager of the United States Borax & Chemical Corp., Pacific Coast Borax Division retired on Feb. 1 after 55 years with the company. He is succeeded by Warren Coray.

AC

STAUFFER CHEMICAL CO., New York, has appointed Charles F. McMackin as superintendent of the company's Portland, Ore., plant. Mr. McMackin joined Stauffer in 1943 as a control chemist.

AC

THE MITCHELL INSECTICIDE CO., Fairfax, S. C., has exercised its option to buy the Ozark Building No. 1 in Helena, Ark. Mitchell manufactures insecticides.

AC

THE USDA has just issued new tolerances on Diuron, allowing 1 ppm on cottonseed, grapes, pineapples, potatoes, and sugarcane and 2 ppm on alfalfa and grass crops.

AC

ROBERT B. TROXEL has been appointed sales manager for the Lebanon Chemical Corp., Lebanon, Pa.

AC

THE LIQUID FERTILIZER NITROGEN AND EQUIPMENT CO., Inc., New Iberia, La., has been granted dissolution of its charter of incorporation.

AC

BERNARD CLAYTON has been named district manager of Diamond Black Leaf Co.'s Western District Sales Office in San Jose, Calif.

AC

DR. C. LOYAL W. SWANSON has been appointed agronomist for the research and technical department of the Texas Co., New York. Dr. Swanson is directing Texaco's research in experimental applications of synthetic plant nutrients.

AC

H. E. COLEMAN has joined the polychemicals division of West Virginia Pulp and Paper Co., New York, as sales manager.

AC

HYDRO-PAK CO., Marthaville, La., has been issued a charter. The firm will be engaged in manufacture and sales of fertilizers.

AC

CHASE BAG CO., Chicago has advanced R. H. Ayers to sales manager of the paper bag division; R. H. Ploeger was named manager of the Toledo Sales Division.

AC

RAYMOND BAG CORP., a division of Albermarle Paper Mfg. Co., announced R. J. Stevens as midwestern district manager.

FULTON BAG AND COTTON MILLS, New Orleans, La., reported a profit of $676,905, before federal income taxes, for the fiscal year ending Nov. 26, 1956, and a working capital of $9,024,354, an increase of $792,262 over the previous year.

AC

CAMPBELL FERTILIZER CO., Gueydan, La., has been granted a charter. Capitalized at $15,000 the firm will distribute retail and wholesale fertilizers.

WITCO CHEMICAL CO., New York, appointed H. Schoenfield to the newly created position of manager of polyester sales.

AC

AMERICAN AGRICULTURAL CHEMICAL CO., New York, reports D. S. Parham has become responsible for all its production activities, exclusive of the phosphate rock mines, as general superintendent of production

AC

MARCH 25th is closing date for entries in the fifth annual Clark Equipment Award Contest for members of the American Materials Handling Society. Details from Clark Equipment Co., Battle Creek, Mich.

AC

JOHN A. HANDY, JR., financial vice-president and controller of Chemical Construction Corp., New York, has been elected a member of the corporation's board of directors.

AC

RAY P. MILLARD was recently appointed executive director of J. Carl Dawson & Associates, St. Louis. Mr. Millard is directing the detailed preventive sanitation consulting activities of the firm, which serves many types of food processing operations.

AC

MISS AUDREY CHEEK has joined the staff of the American Bio-Chemical Laboratory, Inc., Baltimore. Miss Cheek is a graduate of the University of North Carolina.

AC

THE TEXAS CO., New York, has completed facilities at Port Arthur, Tex., for the production of diisobutylene, used in the manufacture of plastics, elastomers, lubricating oil additives and other chemical products.

AC

CARL G. HOGBERG has been appointed vice president of the Michigan Limestone Division of the United States Steel Corp., Cleveland.

AC

DAVIDSON CHEMICAL CO. has appointed Perry O. Onstot as sales promotion manager and agronomist for the mixed fertilizer division.

AC

FRED KOELBLE has been named staff assistant for the corrosion engineering products department of Pennsalt Chemicals, Philadelphia.

AC

MONTECATINI CO., Italy, is reported to be considering three sites in the U. S. for fertilizer production.

AC

VICTOR CHEMICAL WORKS, Chicago, will erect a plant along the Little Calumet River, Chicago producing phosphoric acid.

TYPE 41 CLAY

In making organic concentrates using benzene hexachloride, chlordane, toxaphene, and other similar materials, it is important to have the concentrates free flowing.

TYPE 41 Clay can be combined with more costly diluents, such as Fuller's earth, and the result will be a free-flowing concentrate, at a lower cost to the producer.

TYPE 41 Clay has the following advantages:

NON ABRASIVENESS

FINE PARTICLE SIZE

ABSORBTIVENESS

PROPER BULK

HIGH INSECTICIDAL VALUE OF CLAY ITSELF

LOW PH VALUES

NO PHYTOTOXICITY TO PLANTS

OUTSTANDING ABILITY TO STICK TO THE LEAF

For Further Information or Samples Write to

SOUTHEASTERN CLAY COMPANY

Aiken, South Carolina

EDITORIAL

(*From Page* 31)

ent content rose to 29% from 27.9% in 54-55 and from 26.1% the preceding year.

Consumption of anhydrous ammonia, aqua ammonia and urea showed a big percentage advance this year, the gains being respectively 21.8%, 30.2% and 33.4%. These very substanital gains reflect the changing pattern in fertilizer nitrogen sources following the tremendous expansion in plant capacity for production of these popular new forms of fertilizer nitrogen. By contrast, use of ammonium nitrate, ammonium sulfate and sodium nitrate dropped off sharply.

A very large (10.6%) percentage increase was apparent in direct application of phosphates to the soil, the greatest share of the increase being contributed by phosphate rock whose use in direct application jumped almost 55%.

An overall increase is also noted in use of potash in fertilizers in the 55-56 crop year. While consumption of nitrogen and the phosphates was on the down side, paralleling the drop in overall fertilizer use, consumption of K_2O managed to register a gain, even though a small one.

The report is of course preliminary, but in past years figures in the final report—which may be expected to be released in three or four months—have closely followed the preliminary figures. Details of the report, mirroring the changing raw material picture in the fertilizer industry, deserve close study by everyone in the fertilizer business.

ALFALFA APHID

(*From Page* 61)

aphid and pea aphid infestations combined. California listed additional cost of $1.75 to 3.00 per acre treated. The principal materials used to control the aphid on alfalfa hay crops are malathion and parathion.

Although the impact of this pest on alfalfa production has been widely felt, there has been only a slight reduction in alfalfa acreage in most states due to the aphid alone. Oklahoma, however, reported a considerable reduction. A fifty percent reduction in acreage in Texas was due to a combination of drought and aphid damage.

Precisely what part drought conditions played in the overall alfalfa loss figures cannot be ascertained, but crop losses in Texas and Kansas were attributed to the combination of drought-aphid damage. These losses were estimated at 6 million dollars in the former state and 8½ million in the latter in 1956. Losses caused by the spotted alfalfa aphid in 11 western and southwestern States were estimated at about $41,800,000 in 1956 compared with $34,400,000 in 1955. In 1954, the first year of infestations, losses were estimated at $5,000,000.

Research results have been very encouraging in showing ways to live with this destructive invader. Satisfactory chemical control measures are being employed, biological control efforts are under way and alfalfa resis-

▸Ammoniators* ▸Coolers ▸Dryers
▸Elevators
▸Granulators*
▸Conveyors

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*TVA Licensed Manufacturer

Renneburg
Continuous Combination Ammoniator-Granulator

SAVES MONEY—Costs less to buy . . . costs less to operate • SAVES TIME—Ammoniation is going on at all times . . . no loss of time in charging or discharging • SAVES SPACE • HIGHER RATE OF AMMONIATION • FLEXIBLE—any retention time can be acquired . . . speed of rotation and bed depth can be easily increased or decreased.

Renneburg
DehydrO-Mat Dryer

Built in a wide range of sizes, the DehydrO-Mat Dryer, though comparable in price, out-performs conventional dryers of similar volume. Compact, it is easy to install in a minimum of space. The varying diameter cylinder regulates air and material velocities . . . controls temperature drop and product retention time . . . assures gentle drying.

Other chemical and fertilizer processing equipment manufactured by Renneburg includes: • Ammoniators • Granulators • Dryer Furnaces • Complete Air Handling Systems • Pilot Plants • DehydrO-Mat Combination Dryers and Coolers

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Pioneers in the Manufacture and Development of Processing Equipment for over 80 years.

tance studies are showing promise. Natural enemies such as insect predators and fungus diseases have helped considerably. California reports promising results from imported wasp parasites.★★

HISTORY OF WACA

(*From Page* 33)

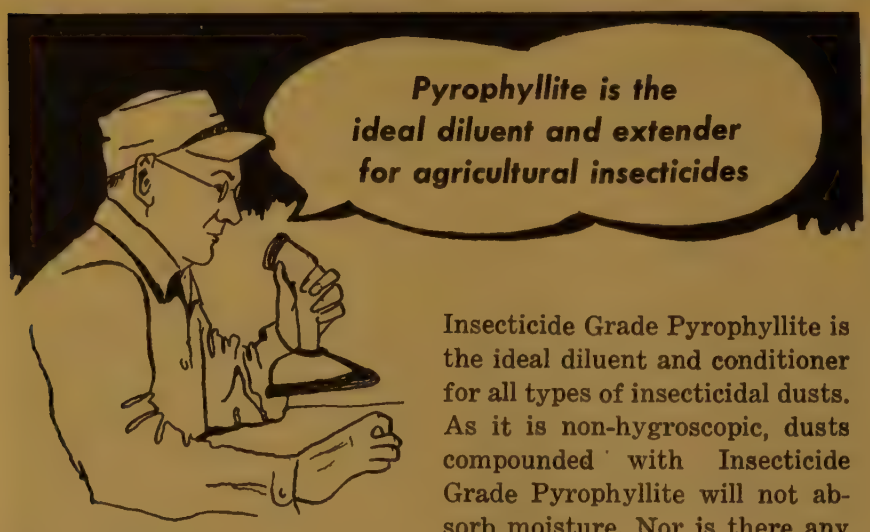
W.A.C.A. depends quite frankly upon N.A.C.A. for guidance in national affairs; but there are "friends at court" in the several states who usually inform the secretary or a legislative committee member of projected actions in time for objective review and discussion with other associations. When undesirable measures reach committees of the various State legislatures needed actions are taken.

Occasionally, however, it is possible to take protective action against an ill-conceived proposal before its introduction into a legislative hopper. Proponents of a measure may lack adequate information and can be convinced by patient, objective, over-the-table discussion that there are compelling reasons why what they propose would not in fact be helpful. Such instances occurred twice in 1956. If what was proposed in one case, had become operative, little benefit actually would have been gained in the public interest, according to Barnard, but the costs of compliance to several of W.A.C.A.'s members would have been many times their annual dues.

Barnard is enthusiastic about the cooperative values of the Northwest Agricultural Chemicals Industry Conference, sponsored by W.A.C.A., which is held each January in Portland, Oregon concurrently with the meetings of the Pacific Northwest Vegetable Insect Conference and the Western Cooperative Spray Project. The latter groups are composed of scientific workers in several areas of the agricultural sciences attached to the extension services of U.S.D.A. and the Land Grand Colleges and Universities. Each conference holds an open meeting for free discussion of mutual problems and real progress has been made toward better relationships and understanding. Of the total of about 250 registrants in 1957 there were 107 industry representatives.

W.A.C.A. holds its annual meeting in the San Francisco area and a spring meeting in Los Angeles. To each of those meetings the Association invites as its guests a total of about 25 U.S.D.A., State and County agricultural officials and University personnel. All W.A.C.A. meetings are now self-supporting.

"A trade association is an essential adjunct to each kind of commercial enterprise," said Barnard. "One of our directors expressed the essence of that thought recently in the course of an official discussion of operational funds. He said that arbitrary classification of an Association's membership into groups has little direct relation to the real value of membership because, regardless of the economic



Insecticide Grade Pyrophyllite is the ideal diluent and conditioner for all types of insecticidal dusts. As it is non-hygroscopic, dusts compounded with Insecticide Grade Pyrophyllite will not absorb moisture. Nor is there any tendency even during extended storage, for the carrier to separate from the active ingredients.

Insecticide Grade Pyrophyllite has superior adhering properties, and because it is difficult to wet, it holds well on the plant leaves even during rain. When used as a carrier for products to be dusted by airplane, it settles rapidly, minimizing drift, waste of materials, etc.

Glendon's Insecticide Grade Pyrophyllite

Wt per cubic foot—30 lbs

92 to 95% will pass a 325 mesh screen

pH range of 6 to 7

Non-alkaline and chemically inert

Average particle size below 5 microns

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Pyrophyllite Company

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Greensboro, N. C.

Plant & Mines, Glendon, N. C.

importance within the industry of any member, an entity frequently must be protected by a collective action, as each member has the same general interests to guard and 'in union *there is* strength.'

"W.A.C.A.," concluded Barnard, "intends to be a worthy mouthpiece for the agricultural chemicals industry in the West."★★

VEG. INSECT CONFERENCE

(*From Page* 93)

now distributed in both the northwestern and eastern parts of Oregon, in western Idaho, western and eastern Washington, as well as in California.

Granular pesticides used by Oregon researchers for direct application as soil insecticides have given results equal to other formulations of the same pesticide, if applied evenly and mixed thoroughly in the soil. Howard Dorst, ARS, USDA, Logan, Utah told the group how a special problem of drosophila control in cull peach piles had been solved by means of a granular pesticide formulation when sprays and dusts of the same material had been ineffective. 30 days control was obtained with one application of granular material. The "zone treatment" effect of granules offers many new uses for formulations of weed control materials and pesticides for cutworm and other forage pests. Such formulations will offer greater efficiency and reduce the residue deposit on forage crops.

1957 officers for the conference are: chairman J. R. Douglass, USDA, ERB, Twin Falls, Idaho; Co-chairman D. G. Finlayson, Dominion Entomological Laboratory, Kamloops, B.C.; and secretary, Howard E. Dorst, USDA, ARS, Logan, Utah.

WESTERN SPRAY PROJECT

(*From Page* 93)

resistant to Mitox, but additional study will be needed to confirm this.

Field Testing New Chemicals

INDUSTRY'S views of this subject were discussed by Dr. René Blondeau, Shell Development Co., Denver, who outlined the broad steps through which a new compound passes, making clear that synthesis and screening of new materials is an industry responsibility, with only mathematical chances of success; certainly it would not be reasonable for an institution to operate on that basis; for even when a product does prove to be promising, lack of patent position may rule out its development.

"Toxicological data is the function of industry, as is residue analysis, but industry's responsibility should end with information on major crops necessary for federal label approval. It should not have to extend to specialty crops. These are the responsibility of the Experiment Station," Dr. Blondeau concluded.

The Experiment Stations' views of the situation were stated by Dr. Paul O. Ritcher, Oregon State College, who said that one of the biggest problems of the Experiment Station is to decide which products out of

INCREASE MORTALITY WITH BARDEN CLAY

For combating pests in cotton, fruit, truck, cereal and forage crops, Barden Clay is the choice of leading formulators throughout the country. Barden-containing sprays and dusts are delivering superior control with Lindane, Malathion, Chlordane, DDT, Parathion, Endrin, Dilan, Pyrenone and all modern pesticides...for Barden Clay combines top quality with considered economy.

WETTABLE POWERS—For high adsorptivity, excellent wetting and vastly superior suspension, Barden is replacing more expensive, less efficient carriers.

DUST CONCENTRATES—With fine particle size, high adsorption, lowest abrasion and lowest cost, Barden provides maximum economy with less maintenance and fewer shut-downs for repair.

FIELD DUSTS—For maximum deposit and retention, lowest duster-abrasion and medium bulk density, Barden out-performs all other diluents.

Add power to your product, punch to your sales...use Barden Clay! *Write for a working sample today.*

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World's Largest Producer of Aerfloted Kaolin Clay

7-Point Barden Score	
✓	Improved dispersion
✓	Lower abrasion
✓	Better coverage
✓	Better retention
✓	Higher mortality
✓	Greater uniformity
✓	Maximum economy

For Dust or Spray... use Barden Clay—
the Low-Cost Scientific Diluent

the large number of candidates being developed should be included in their field work. Data furnished by industry has been of great help in deciding which materials to use, he indicated.

The use of experimental materials on crops disqualifies their commercial sale or use, and in this way places a considerable financial burden on the Stations when even moderate acreages of high value crops are used in test work. Better containers for shipping and storage of test materials would be helpful, as some items have been received in torn sacks with only a portion of the contents arriving at final destination. Slip-top fiber drums forcibly release a puff of product each time they are opened. Use of fiber drums with metal tops and lever closure would work out well for both dusts and wettable powders. Experiment Stations welcome the opportunity to submit written reports to manufacturers who have furnished test material.

1957 project officers are chairman, George F. Knowlton, Utah State College, Logan; co-chairman, Harold F. Madsen, University of California, Berkeley; and secretary, Anthony S. Horn, University of Idaho Extension Service, Boise.★★

HEALTH CONFERENCE

(*From Page* 67)

hydrocarbon insecticides are non-phytotoxic to plants. They are, however, systemic poisons to insects, fish, mammals. Intoxification may occur by absorption through skin contact, by ingestion, by inhalation." Mr. Princi outlined in detail symptoms of poison cases and physiological reactions.

Reviewing experiences in California on controlling hazards, Robert L. Metcalf, University of California Citrus Experiment Station, Riverside, said: "California is the nation's largest crop producing state. We find that use of agricultural chemicals is an absolute 'must' for maintaining California's lead.

"Twenty-five percent of the money spent in the U.S. for pesticides is spent in California. We have a very broad diversity of crops. Actually the 'Golden State' is a testing and proving ground on various crops for the rest of the country.

"If users of toxic pesticides are fully aware of the hazards of handling these poisons, danger can be avoided . . . Despite the enormous use of pesticides in California agriculture (8½ million acres treated in 1956) our safety record is excellent. . . . Out of some 14,000 farm injuries reported for 1956 only 140 (or 1%) were caused by the hazards of using pesticides.

"We find that practically no pesticides, when used properly and at the normal rates of application, exist in the soil longer than a year. There is no danger of any slow toxic build-up in the soil.

"Two of the most highly toxic chemicals that have caused most of our poison case injuries are Parathion and TEPP."★★

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N. W. AGRICULTURAL CONF.

(*From Page 47*)

and experimental work on new and untried carriers, on chemical instability, and phytotoxicity," he concluded.

Soil Fungicides

Nematologists are the people who have led the way in developing machinery and materials for effective soil fungicide work. E. K. Vaughn, OSC, reported that PCNB (Terrachlor) has been the most effective material used to control club root of crucifers. The organism is very long-lived in the soil—as much as 20 years without a susceptible crop. Treated plants still have clubs, but the roots remain healthy, and no secondary invasion of pathogens occurs; growers also get a fair measure of weed control. This same material has assisted in the control of black root (wire stem) of crucifers. PCNB aids to some extent too in the control of white mold of beans. In Washington, use of PCNB has retarded the early growth of scab on potatoes, and while yield was down on treated blocks, grade was up and and stem cankers decreased.

Vapam has given outstanding results in the control of Verticillium wilt in southern Oregon. Results extending into the second year from Vapam have been observed in plots planted to potatoes the year after treatment.

Dr. T. A. Loomis, University of Washington, Seattle, demonstrated the action of anticholinesterase agents on laboratory animals. He showed his audience by means of colored movies exactly what happens to a guinea pig after an application of an anticholinesterase agent. The action on each vulnerable part of the body was clearly depicted and compared with the parallel effects on the human body.

Physicians, unless given advance clinical data, hesitate to administer atropine in the amounts required—as this rate is ten times that normally used, yet prompt use of this effective antidote is needed to counteract the action of the nerve poison. Repeated doses of atropine may also be needed. Death can occur rapidly after certain types of exposure; with TEPP 10 minutes after splash exposure—parathion is slower—it takes about an hour.

"Common sense" precautions are best in preventing poisoning before it occurs," Dr. Loomis said. "People who manufacture and handle the product should know it can cause serious effects, as *all* effective pesticides have some effect on their human users, thus all who handle them should be told of the products' toxicity. At times there is a definite need for masks and for eye protection. Children and pesticide containers are not compatible — they should be kept widely separated."

The "Rival World" represented by insects is the central theme of Shell's new colored film which is a most interesting and educational picture on the international aspects of the insect problem. In commenting on the film, L. F. Stayner, Shell Chemical's West Coast sales manager, told the group that one of the prime reasons for producing the movie was to stimulate students to consider careers in the Agricultural Chemicals and Public Health fields, and to show widely what the Agricultural Chemicals Industry is doing, and to dramatize certain features of this work.

Rohm & Haas's new film on powdery mildew was shown to Industry Conference members. Of special interest to orchardists, this picture made by Cornell University shows graphically how infection takes place on the tree and the proper control measures to use for prevention of infection. Mr. Gordon Brandes of Rohm & Haas indicated that this was an early print of the film, and completed copies would be available at a later date.

Conference chairman W. I. Ziegler, American Cyanamid Co., Portland, mentioned that 1957 would be a legislative year and members should be alert to legislation affecting their industry so that WACA legislative committee members could

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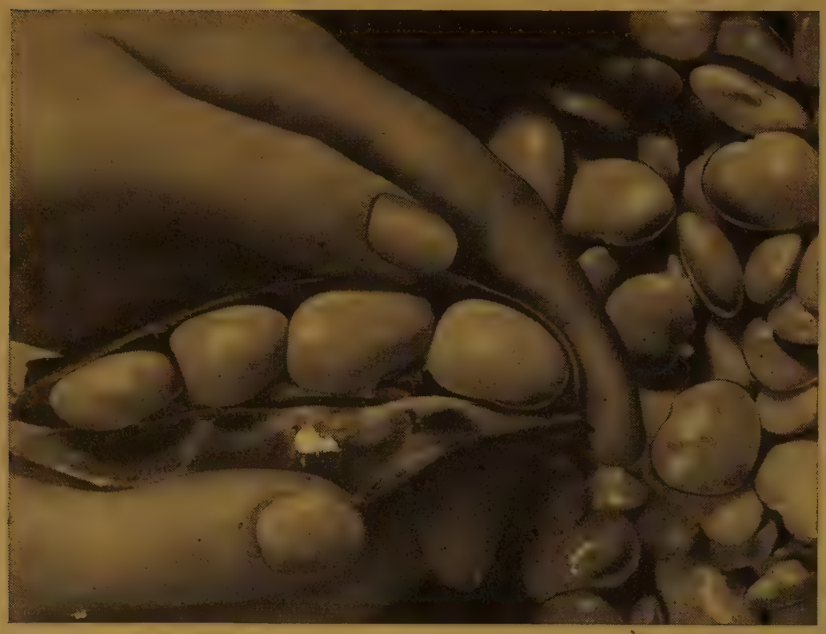

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be alerted to this activity. George Coffman, Diamond Black Leaf Co., Portland, was elected conference chairman for 1958.★★

INSECT BAITS

(*From Page* 35)

and their parasites in Hawaii. Joint Legislative Committee on Agriculture and Livestock Problems. Special Report on the Oriental Fruit Fly. Published by Senate of State of California, pp. 77-83.

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LISTENING POST

(*From Page* 58)

Pot-grown strawberry plants, variety Stelemaster, with buds, flowers, and small green fruits, were sprayed once with the several materials. After the spray deposit had dried, the plants were inoculated with a heavy spore suspension obtained from a mass isolate of the fungus. The plants were kept in a moist chamber for the duration of the experiment at a night temperature of 65°F. The humidity was maintained sufficiently high by intermittent misting to keep the plants wet at all times during the first 10 days. From the tenth to the eighteenth day following inoculation, the plants received only occasional mistings. Two trials were made, using the same spraying and inoculation techniques, source of inoculum and strawberry variety. The data for both trials are given in Table 1.

Thiram at 3 pounds and 1½ pounds per 100 gallons and dichlone at ¾ pound per 100 gallons gave a high degree of control for 18 days.

Thioneb was equally satisfactory at the highest concentration. Mesulfane and Norsulfane gave good control for a 10 days period but were less satisfactory after 18 days. Captan gave moderate to poor control at both periods. Translated into field control, a material giving protection for 18 days of simulated rainy weather would carry the crop through the picking season.

From the performance of the better materials under the severe conditions of these experiments it seemed probable that field trials would follow the same pattern.

Control in the Field: Results of the greenhouse experiments led to comparison of commercial formulations of captan, thiram, and dichlone in field experiments reported by Miller and Stoddard.*

The commercially-formulated materials tested were Captan 50-W containing 50% captan and applied at the rate of 6 pounds in 100 gallons; Phygon XL, containing 50% dichlone and applied at ⅜ pound in 100 gallons; and Thylate, containing 50% thiram and applied at 3 pounds in 100 gallons. The plots were sprayed by the grower in whose field the trials were made. Applications were made on May 18, June 4, and June 14, using a sprayer with a 16 gpm pump carrying 400-600 psi pressure. The spray was put on with a hand gun which made very thorough coverage possible. The long interval between applications was tried because the greenhouse trials indicated that both dichlone and thiram possessed long residual capacity. The first application was made about the start of bloom and the last 13 days before picking. Each treatment was replicated three times on 75-foot rows of Robinson strawberries.

Two counts of infected fruit were made, on June 27 and July 3. Counts were made by removing for count all infected fruit from 5 foot sections of the row, then moving 10 feet further down the row and taking another 5-foot section. Five such sections were counted in each replicate, thus making a total of 15 for each treatment. Both counts were made in the same 5-foot sections, so that the number of new infections occurring between counts could be determined.

The results are given in Table 2. The total number of infected berries obtained from all sections counted in the three replicates of each treatment are given on each picking date. The number of infected fruit is also expressed as a percentage of the number found in the unsprayed control, which is considered as 100 percent. Phygon XL and Thylate gave approximately equal control. This was double that given by Captan 50-W.

The fact that plots treated with Phygon XL and Thylate on June 14 still had less than one-third as many infected fruits as the control 19 days after spraying points to a long residual protection by these materials. Thus a spray applied 5 to 7 days before the start of harvest should carry through most of the picking season. The 10 to 14 days between sprays appears to be short enough to maintain adequate protection. Since many of the strawberry growers of Connecticut are also vegetable growers, they are very busy with other duties during the usual strawberry spraying season. The time gained by spraying every 10 to 14 days as against the 5 to 7 days recommended for materials currently being used could be used very advantageously by them during this busy season.★★

*Miller, P. M., and E. M. Stoddard. Field control of grey mold of strawberries. Plant Disease Reporter 40 (9):788-789. Sept. 15, 1956.

SPRAY OPERATORS

(*From Page* 41)

The Purdue scientist reported amino triazole will eradicate Canada thistle and is the "best herbicide we have seen for this purpose so far."

Lee said best results have been obtained by May and June applications when plants were from 12 inches tall to bud stage. Spraying after plants mature seeds is not as effective as earlier treatments. Spraying regrowth in August and September after mowing appears to be satisfactory but not as effective as when the first season's growth is sprayed.

The recommended application is 8 pounds (4 pounds of actual amino

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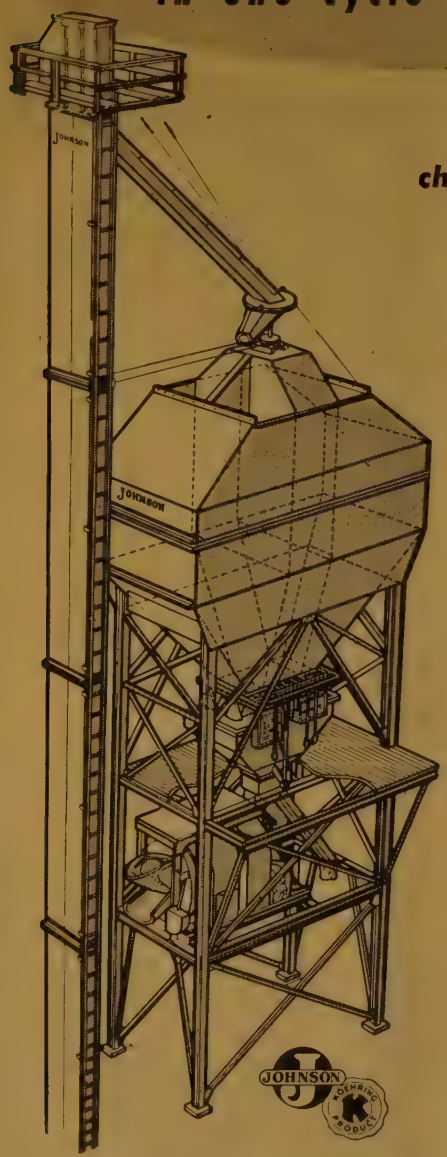

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triazole) per acre. Field sprayers should be equipped with a boom and the amino triazole powder diluted in 30 gallons of water. If applied with a gun, a dilution of 8 pounds in 100 gallons of water was suggested. Sprayed plants should not be disturbed by cutting or cultivation for 10 days or more after application.

For controlling Johnson grass, Mr. Lee pointed out that chemical treatments although expensive are effective and practical for killing small patches.

He listed four herbicides which could be used: sodium chlorate at 4 pounds per square rod, TCA at 1 pound per square rod, and CMU at ⅓ pound per square rod. These are soil sterilants that will kill patches of Johnson grass. Dalapon sprayed on the foliage is recommended in applications of ¼ to ½ pound per square rod or 40 to 80 pounds per acre.

For control on large areas, Mr. Lee recommended clean cultivation for one season. The area should be plowed before Johnson grass produces seed heads and top growth should be kept down during the summer by frequent cultivation. Plowing and cultivation following harvesting of wheat is also effective.

Evidence continues to accumulate to show very little likelihood that 2,4,-D and 2,4,5-T as used are dangerous to livestock, stressed Homer L. Jacobs, Davey Tree Expert Co. of Kent, Ohio. To prevent damage to crops and ornamentals when spraying brush, Mr. Jacobs said control in limited areas can be achieved just as well by delaying treatment until the dormant season when basal application will do the job.

For generally good brush kill and much less drift damage, Jacobs recommended the use of amine formulations of 2,4-D and 2,4,5-T. He also feels straight 2,4,5-T application can be profitably used to kill resistant species where mixtures of 2,4,-D and 2,4,5-T won't do the job.

Commenting on new chemicals for weed control, Fred Slife, University of Illinois weed specialist said "Randox" is the best selective annual grass chemical available at present.

Both corn and soybeans have a natural tolerance to it. Although effective against grass weeds, it is not good enough on broadleaf weeds and another chemical will have to be added to give complete control. At present, it is expensive and irritating to handle, he reported.

Although amino triazole will soon be available for Canada thistle control, Mr. Slife warned it does not have clearance for use on land where food and feed crops are grown. Also, it is not selective, so even if clearance for use is obtained, it should be used before crops are planted or after they are harvested.

Butyric acid compounds will be tested widely in 1957, Mr. Slife reported. Although similar to 2,4-D in action, he feels this group of chemicals will not compete in price. It appears their main advantage may be where certain selectivity is desired. As yet these compounds are not cleared for use by the Food and Drug Administration.

Simazin is another new pre-emerge chemical first evaluated in 1956. Mr. Slife reported that corn appears to have a great deal of tolerance, and yet most common broadleaf weeds and annual grasses found in corn fields seem to be sensitive. Bean crops, and particularly soybeans are quite sensitive to this chemical. Simazin will be tested widely in 1957, but no recommendations were made at the meeting because it has not been cleared by Food and Drug officials.

EPTC was evaluated for the first time in 1956. It is a pre-emergence chemical and research to date shows that both corn and soybeans have a very good tolerance to it. Yet most of the annual grasses and broadleaf weeds are quite sensitive. Rates of 4 pounds per acre of active material have given good control of weeds for 6 to 8 weeks after application. Mr. Slife feels that EPTC may eventually have a more diversified use than Simazin because some broad leaf crops are tolerant to it.

For controlling giant foxtail (or wild millet), some encouraging news was given by Earl Spurrier, University of Illinois agronomist. He reported that Randox appears to be very promising for controlling this serious weed pest in Illinois corn and soybeans fields.

It appears to be effective under most conditions when applied at the broadcast rate of 4 pounds of acid in at least 20 gallons of water per acre. Because of its relatively high cost, it should be applied efficiently in a ten inch band directly over the row of corn or soybeans at planting time. If the crop were planted in 40 inch rows, this would reduce the application to one pound of Randox and 5 gallons of water per acre, Spurrier explained.

More Soil Insecticide Results

TESTS on soil insecticides to control insects attacking seed, seedlings, and roots continue to be encouraging, reported J. H. Bigger-entomologist for the Illinois Natural History Survey.

Tests with aldrin and heptachlor in 1956 showed an average of 6.8 percent more plants in the stand of treated plots compared to those not treated. Usual rate of treatment was 1.5 pounds per acre as sprays or granules, or applied in fertilizer mixtures.

Use of Liquid Fertilizers

"THUS far experiments have not shown consistent differences between liquid and solid forms of commercial fertilizers, when applied in equal amounts and in a similar manner," reported R. K. Stivers, agronomist from Purdue University. "A pound of nitrogen is a pound of nitrogen, regardless of where it comes from," he stressed. Both liquid and dry forms seem to have equal availability to crops, he reported.

The day before the Custom Sprayers School began, the Illinois Aerial Applicators Association met and elected R. Danforth, Monmouth,

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president; L. Gilbert, Arcola, vice-president; and Lillard Heddon, Pekin, secretary-treasurer.

The Illinois Ground Sprayers Association elected Joe Garland, Dixon, president; Vernon Anderson, Newark, vice-president; and A. E. Pickard, Mt. Vernon, secretary-treasurer.★★

FERTILIZER REPORT

(*From Page* 49)

North Central and West North Central regions where it is used mostly. The consumption of normal superphosphate appears to have decreased about 15 per cent, while the other two principal phosphate materials—concentrated superphosphate and the ammonium phosphates (11-48, 13-39, 16-20)—showed little change from their use in 1954-55.

The consumption of anhydrous ammonia for direct application is estimated to have totaled 431,000 tons, an increase of 21.8 per cent over the use in 1954-55 (Table 3). The increases, occurring in all regions, were greatest for the East South Central, West South Central, and Mountain regions where they were approximately 40 per cent in each area. The use of aqua ammonia increased 30.2 per cent, but the consumption of nitrogen solutions was nearly the same as in 1954-55.

Primary Plant Nutrients

THE estimated quantity of primary plant nutrients contained in all fertilizers consumed in the United States and Territories was 6,081,000 tons. This was 39,000 tons (0.6%) less than in 1954-55. The total for 1955-56 comprised 1,952,000 tons of nitrogen, 2,240,000 tons of available P_2O_5, and 1,889,000 tons of K_2O. These quantities represent decreases of 9,000 tons (0.4%) for nitrogen and 44,000 tons (2.0%) for available P_2O_5 and an increase of 14,000 tons (0.8%) for K_2O from the respective consumptions in 1954-55.

Increases in the consumption of total primary nutrients, shown in five of the ten regions, were proportionately the greatest in the West South Central (7.4%) and Pacific (5.7%) areas. The largest decreases were in the West North Central (8.0%) and Middle Atlantic (5.9%) regions and the Territories (7.3%). The use of nitrogen and P_2O_5 increased in five regions, and K_2O consumption increased in six regions. With the exception of K_2O, however, these increases did not offset fully the decreases that occurred in the other regions.

The consumption of primary plant nutrients supplied by mixed fertilizers is estimated to have been 4,275,000 tons, comprising 815,000 tons of nitrogen, 1,789,000 tons of available P_2O_5, and 1,671,000 tons of K_2O. These quantities represent 12,000 tons (1.5%) more nitrogen, 32,000 tons (1.8%) less available P_2O_5, and 13,000 tons (0.8%) more K_2O than those in 1954-55. Materials used for direct application supplied 1,137,000 tons of nitrogen, 451,000 tons of available P_2O_5, and 218,000 tons of K_2O, representing decreases of 21,000 tons (1.8%) for nitrogen and 12,000 tons (2.7%) for available P_2O_5 and an increase of 1,000 tons (0.6%) for K_2O as compared with 1954-55.

Total primary nutrients in all mixed fertilizers consumed in the United States and Territories averaged 29.0 per cent, as compared with 27.90 per cent in 1954-55. For all direct-application materials that supplied primary nutrients the corresponding averages were 27.5 and 27.86 per cent.★★

CALSPRAY

(*From Page* 44)

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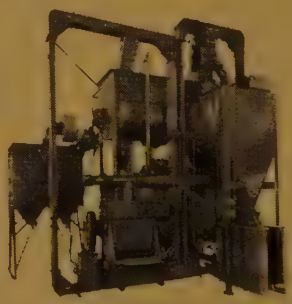

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manufacturing progress have brought together fields which a few years ago seemed far apart — petrochemicals, inoranics, and the utilization of many of the by-products of industry. In its amazing advances of science applied through unit processes, chemical engineering is rapidly overriding the barriers which cut-and-try erected during the periods of learning how.

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LINDANE

(*From Page* 37)

Dieldrin and Lindane/Organophosphorus compounds.

Lindane versus DDT

SINCE the war, DDT has become well-known in Germany as in other countries. In Germany, this product had gained a high reputation with all military and civilian personnel who had at one time or another by this means been disinfested of lice. It followed naturally that DDT, therefore, was chosen initially for crop protection.

The situation for marketing DDT in Germany, however, was, that for crop protection purposes, only three firms were licensed to supply. The demand for DDT so far exceeded available supplies, that there was still quite a substantial amount of room on the market for BHC. This ready interest on the part of buyers gave a strong impetus to the development of BHC, and its purification eventually to the stage of Lindane.

As time went on, practical experience was able to show the rela-

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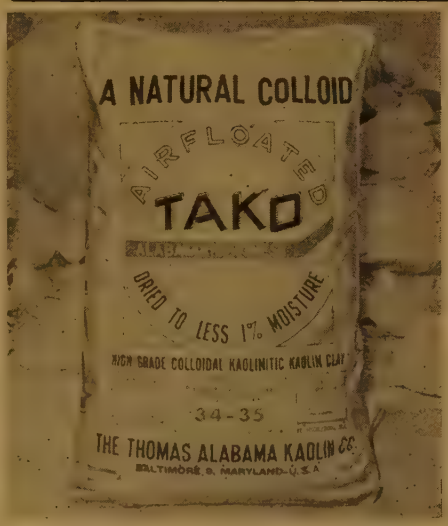

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tive merits of preparations based on DDT, BHC and later Lindane. DDT with its somewhat slow, though satisfactory effect had in its favor the fact that it could be used on potato crops without danger of taint. BHC on the other hand possessed a good initial effect but the disadvantage of tainting the flavor of the potatoes. Better still, Lindane besides being taint-free (provided that direct treatment of the plant above ground was the method followed) possessed also the striking initial effect which played a very important role in our climate with its frequent summer rainfalls. These were the main arguments of the large producers of Lindane and DDT. As a result of further experiments, it was found that DDT and Lindane could be blended in certain proportions to form superior preparations. DDT achieved kill at low temperatures and had a long residual effect, whereas Lindane contributed a very strong initial kill which was particularly effective at higher temperatures. It was recognized that in years when bad weather prevailed, for Colorado beetle control (which is our sole concern in this context) a residual action was not absolutely necessary. For this reason, in many instances the Lindane proportion of these mixtures was increased, according to individual requirements. Subsequently, products based solely on Lindane came to be used widely, and the increasing trend towards this type of preparation is becoming more and more evident even today. In addition to Lindane/DDT formulations, all the other combinations with Lindane mentioned previously, e.g., Lindane/Chlordane*, are in use today. In Colorado beetle control the combination Lindane / Chlordane has gained nearly as much importance as Lindane/DDT.

Lindane Today

At present there are four main groups of products based on Lindane. Dusts containing 0.5 and 0.6 per cent w/w of Lindane are used for direct plant treatment in the control of biting and sucking insects. Preparations for soil treatment are marketed in a concentration of 1.5 per cent w/w as officially prescribed. Seed dressings contain 20 per cent w/w of Lindane whereas seed dressings incorporating fungicides have 20/25 per cent w/w. For the preparation of sprays (suspensions), wettable powders containing 8-80 per cent w/w Lindane are available.

The most important pests against which Lindane is employed and the most important fields of application are as follows:

Colorado beetles are controlled with dusts, suspensions and emulsions. The average standard rate of application is 0.1 lb. Lindane/acre. *Meligethes aeneus, Ceutorrhynchus napi* and *Quadrides* are controlled with dusts at the rate of 0.075-0.1 lb. Lindane per acre The grubs of scarabaeid beetles (*Melolontha, Amphimallus*), wire worms and larvae of root maggots are eradicated by soil treatment with Lindane-based dusts of coarser grade Sand is used widely as a carrier, and the preparation can be broadcasted either manually or with appropriate apparatus. The rate of application varies between 0.5 and 1.5 lb. of the active substance per acre. In recent years, granular preparations of Lindane in combination with fertilizers came to the fore. In this connection, however, certain difficulties arise with regard to officially prescribed minimum rates of application for fertilizers, and the normal rates of application for insecticides. For grub and wire worm control liquid products are rarely used for "total area" soil treatment due to the great quantity of water which is necessary (4250 gallons per acre). In horticulture, however, the application of liquid products (drenching) for control of cabbage flies (*Chortophila*) has given good results.

Very often it is not the cockchafer grub but rather the adult of the species which is controlled. This is accomplished in most cases

*A publication on the use of Chlordane in Germany is under preparation.

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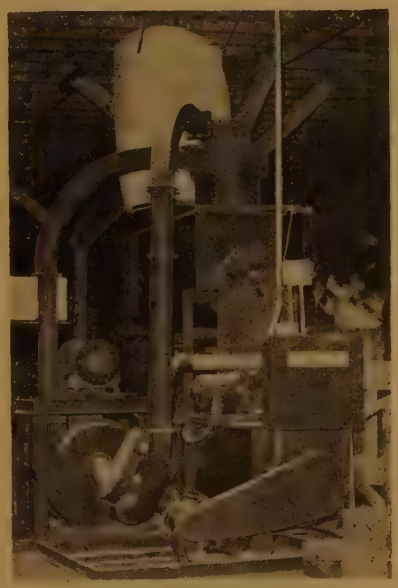

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5. **Disregard wild rumors as to what competitors are doing.**
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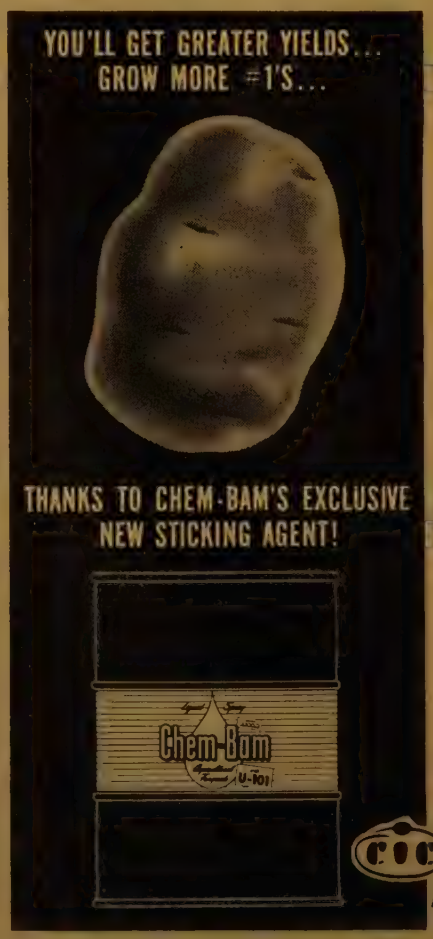

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with BHC, since it is a question mainly of application in forestry around the outskirts of a wood.

One of the most important fields of application (as regards quantity of Lindane used), is seed protection of grain and sugar beet. A 20 per cent Lindane powder is used at the rate of 4 oz. per 100 lbs. grain or 8-10 oz. per 100 lbs. for the seeds of sugar beet (Cluster and Monogerm). Combined Lindane/mercurial compounds have quite a following, but gradually combinations with organic fungicides are coming into prominence.

Lindane is used for control of aphids, thrips, white flies, etc., in glass houses, and for this purpose fumigation strips or tablets (the smoke serving as a carrier) have established themselves. Lindane/DDT formulations are used widely against codling moth, and though Lindane is seldom used alone in orchards, it has good effect against *Hoplocampa sp.*, *Anthonomus pomorum* and aphids. As regards vineyards it is unusual in Germany to encounter the use of Lindane, the exception being in the nurseries and for newly planted vines. The objection to its wider use in this sphere is based on a regulation—perhaps somewhat obsolete—which is still adhered to for fear of possible contamination. On the other hand, it has been clearly demonstrated that Lindane is harmless in this respect even to so susceptible a target as the grape. Lindane could in fact be used against some species of weevil quite commonly met with in viticulture, e.g., *Byctiscus betulae*. In addition to soil treatment in vine-nurseries, Lindane is used in bait form for cutworm control.

In the veterinary field, Lindane is also used widely, for example, against poultry mites, fleas, lice and mallophaga. Sheep dipping is also practiced in Germany, though to a limited extent, and is carried out with BHC wettable powders and emulsions.

The use of Lindane as a household insecticide is also very important, particularly because in Germany it is permitted to be used in aerosols. Because of its rapid effect, a wide range of aerosols contain Lindane. Lindane is recommended for domestic use against mosquitoes, bedbugs, fleas and a range of other worrisome pests such as clothes moths and houseflies. Electric Lindane vaporizers have not become very popular in Germany. The degree of resistance of houseflies to chlorinated hydrocarbons varies greatly in different parts of Germany. There are areas where a very strong resistance is encountered, but there are also others where Lindane alone without any additive can be used effectively for fly control. As it is, however, obviously necessary to guarantee a complete kill of resistant strains, Lindane sprays and aerosols very often contain additives such as pyrethrum, allethrin or organic phosphates, to guarantee an overall efficiency.

Contrary to the practice, for example in France, Lindane is not used in large scale storage of foodstuffs. The admixture of 5 ppm of Lindane to small quantities of grain is, however, permitted in principle, with the proviso that after thorough cleaning treated must be mixed in equal proportions with untreated grain before subsequent use as food or fodder. In this connection, it must be pointed out that Germany has as yet no legislation such as the Miller Amendment, so that for the time being an adherence to American practices will probably be favored.

Conclusions:

SUMMARIZING the foregoing remarks, three salient observations can be made, as follows:

- The Colorado beetle was instrumental as regards the introduction of BHC and Lindane in Germany.
- Lindane plays an important role in Germany as the active ingredient of dusts and granular preparations, seed dressings, liquid products (suspensions or emulsions), fumigants and aerosols.
- The use of Lindane in combination with fungicides and other insecticides (DDT, Chlordane, Dieldrin, Aldrin, Toxaphene, organic phosphates) is well established.★★

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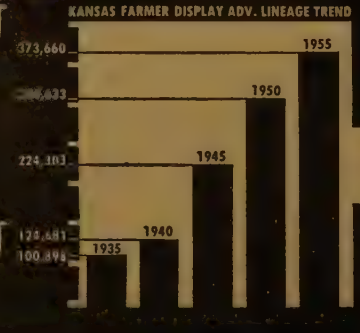

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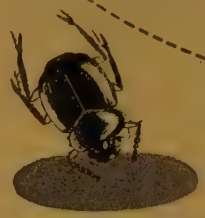

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WANTED delivered price of car-lot, soil grade Triple Superphosphate, Soil Sulfur, Magnesium sulfate, Manganese Sulfate, Copper Sulfate, Boron, Cobalt, Molybdenum. Curlee Cropmaker Co., Box 696, Sinton, Texas.

WASHINGTON REPORT

(*From Page* 53)

bill, at least in principle, it then usually becomes a part of the "Administration package."

Question here in Washington is, will this happen during this session of Congress? If it does, the Food & Drug Administration's real thinking on this matter may well come to light.

There are some who feel that the Food & Drug Administration would like to include pesticides in a food additive bill, thereby increasing its jurisdiction over these chemicals. It might even be possible to clamp down on the amount of residues through the authority of a food additive bill, which could have the effect of nullifying the spirit of the existing Miller Law.

Before you say—I thought the legislative situation on the pesticide residue situation was stabilized — it should be added that nothing is ever stabilized in Washington. Nearly everything is under continuous review, with a constant ebb and flow of points of view. There's a feeling among some that pesticides need to be even more stringently regulated. This opinion is bubbling beneath the surface. It may come to light by summer.

* * * * *

The recent American Road Builder's Conference in Chicago brought out the fact that many highway engineers and those in the related sciences have vast funds of knowledge and great skill on just about every phase of highway operation except maintenance of the roadside. What these skilled men know about concrete and asphalt is as impressive as what many of them don't know about how to seed an area, mulch it, keep it free of weeds, and protect costly roadside plantings from insects and diseases. Matter of fact the use of fungicides along roadsides throughout the United States is practically zero, and the use of insecticides not much higher. What little is spent on chemicals goes into herbicides. Even here it's only a tiny amount.

Point brought out during the conference was that part of the one and a half percent of road construction funds that can be used for research should be devoted to the more efficient maintenance of the roadsides.

* * * * *

Federal quarantine against the soybean cyst nematode seems to be favored by most authorities in question

LETTERS TO THE EDITOR

(*From Page* 8)

future, and I hope that I may convince him that he should prepare a short article on results of his research which would be submitted to AGRICULTURAL CHEMICALS for publication.

Vincent Sauchelli
FERTILIZER VIEWS & NEWS
Baltimore, Md.

I have just now been able to obtain a copy of AGRICULTURAL CHEMICALS containing the article "The Influence of Phosphoric Acid on the Metabolism of Plants" by W. U. Behrens.

I want to thank you for translating this article and for making it available. At the present time, I am conducting an experiment in the greenhouse with potatoes on time as a factor in phosphorus absorption. The plants receiving no phosphorus are showing extreme symptoms of phosphorus deficiency after 55 days. Those which were recently switched to a full phosphorus dose, 62 p.p.m. P, showed a reaction in less than 3 days. Those plants which have received the full phosphorus dose for 55 days and are now receiving no phosphorus have begun to slow down in growth.

The most interesting formative effects of phosphorus deficiency are the checking of growth of the meristematic tissue, shortening of the tuber stolons and reduction in number, and the darkened color of the leaves.

This experiment is so intimately connected with Dr. Behren's article that I could not resist the urge to write you about it. As the experiment progresses and I am able to run phosphorus on the top of the plant, bottom of the plant, tubers, roots, and stolons, I feel sure I will have a very good picture of the influence of phosphorus in potato production. Now that I have read Dr. Behren's article I will also pay some attention to the carbohydrate production and its transport from plant to tubers. If you are in the vicinity of Beltsville soon, I would be very pleased to show you this work.

G. V. C. Houghland
USDA, HORTICULTURAL CROPS
Beltsville, Md.

as the best means for confining the North Carolina and Missouri-Tennessee areas of infestation. Further infestations are expected to continue to show up from separate introductions of this pest from the Orient.

The other quarantine is aimed at a parasitic plant, known as witch weed, which causes a destructive disease of corn. Differences of opinion still exist as to the type control program best suited to meet this danger.

* * * * *

Expanded participation by the U. S. Department of Agriculture in an effort to facilitate control of fertilizer quality is being urged by the Department's Advisory Committee on Soils, Water, and Fertilizer Research. The Committee also urges the initiation of research on potassium fertilizers of low solubility. In addition to this, the Committee is anxious for more basic research to be conducted on the reaction of lime with soils and on the effects of liming upon nutrient availability to plants. Expanded studies on the complex inner-relations of the factors that influence the movement of water into and through the soils is also being asked.

This ten-member Committee is one of scores of such groups which meet periodically to advise the Department of Agriculture on activities under the Research and Marketing Act of 1946. Dr. Russell Coleman, Executive Vice President, National Plant Food Institute, of Washington, D. C. is one of the members.

Copies of a recent report on the committee's activities are available from the Executive Secretary, Dr. C. P. Barnes, Office of the Administrator, Agricultural Research Service, U. S. Department of Agriculture, Washington 25, D. C.

This Advisory Committee can have a pronounced influence on the allocation of the Department's research appropriation and the direction of research in the future.

* * * * *

The writer expects to report soon to the Foreign Trade Committee of the National Agricultural Chemicals Association on latest developments in the field of agricultural communications and pesticide publicity and advertising activities in Brazil, and a number of Central American countries. As soon as data collected during my February work study trip to these areas is completed and analyzed, highlights will be made available to the Committee.

* * * * *

Here in the U. S., the agricultural education and communications activity of government and industry is rolling ahead better than ever. Latest reports on the educational job of U. S. extension workers, shows that they made 21½ million personal contacts, 9½ million phone calls, and over 8 million office calls, in addition to 4 million farm and home visits. In addition these extension workers, often called county and home agents, wrote almost 200 thousand news stories, appeared on 15,000 television programs, broadcast 228,000 radio programs, and distributed 27 million publications.

Someone ought to figure out how much of this vast educational effort touches on the use of agricultural chemicals and whether or not industry could be more helpful in facilitating the extension worker's overall function in this field. Also there may be quite a number of holes in this educational program, as extensive as it is, which can be effectively plugged by industry.

Inasmuch as there are fewer than 6 million farmers in the U. S. today, any farmer who wants information should certainly be able to get himself exposed to it rather easily. But then maybe that's why we have one of the most efficient agricultures in the world.★★

FARM SURVEY

(From Page 51)

Fifty-six per cent of the farmers in the West North Central Region plan to use post-emergence weed sprays in 1957—a six per cent increase over 1956. On the other hand, only fourteen per cent plan to use this type in the South Atlantic Region—down five per cent from 1956.

Farmers plan to increase their use of brush killers in all regions. Most frequent use is planned for the East North Central Region, but a sixty-one per cent increase in the number of users is indicated for the South Atlantic Region.

The number of users of chemicals for control of crop insects will increase in all regions except the South Central Region where only fifty-nine per cent of the number using chemicals in 1956 plan to use them in 1957.

The survey indicates that approximately ninety per cent of farmers buy some kind of veterinary supplies or animal health products. These are purchased from several different types of sales outlets.

The Doane Countrywide Farm Panels is comprised of a balanced cross-section of the nation's full-time farmers, based on the farm population and farm characteristics of each region. The panel includes proportionate regional representation for all of the 2,100,404 farms in the nation with gross farm income of $2,500 or more annually. Excluded from the panel are: farmers with sales of farm products of less than $2,500; residential farmers (those with annual sales of less than $250 worth of farm products); part-time farmers (those selling products valued at from $250 to 1,200 annually, whose operator spends more than 100 days in off-farm work or whose off-farm income exceeds the value of agricultural products sold); and institutional farms (those connected with a public or private institution). These four categories include 2,681,989 farms of which 1,679,298 are in the South Atlantic and South Central regions.

Doane Agricultural Service, Inc., founded in 1919 as a pioneer farm management concern by D. Howard Doane, chairman of the board, is now one of the nation's largest research, farm management and advisory firms. Doane operations include: research and consultation on agricultural management and marketing; management of farms totaling more than half a million acres; publication of the authoritative nationally circulated Doane Agricultural Digest; appraising urban and rural properties; designing functional low-cost farm buildings; and conducting market research and field testing for farm equipment and other farm product manufacturers.★★

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TALE ENDS

PESTICIDE formulators are looking for a further big expansion this season in the use of methyl parathion for control of resistant pests on cotton. Experiment stations right across the cotton belt are recommending parathion for the '57 season in all "hard to kill" areas. Last season there was but one manufacturer, but there will be at least five new producers competing for the market this season,—Shell, Chemagro, American Potash, Cyanamid and Velsicol.

AC

The insecticide market has broadened tremendously over the past five years. Back in '51 cotton pesticides constituted 45% of the total pesticide market, but currently cotton's share is down to somewhere between 25 and 30%. This has resulted not from any decline in the use of cotton poisons, but rather from the development of a series of new and permanent markets which were largely nonexistent five years ago. We refer to the corn root worm program, the grasshopper program, the big increase in sale of nematocides, the current expanding market for control of turf pests.

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Another big market that has been built over the course of the past few years has been fertilizer-pesticide mixtures. In four years this market has developed from nothing to a twenty million dollar a year business. And pesticide manufacturers are looking for a big season on F-P mixtures in '57. Fertilizer manufacturers, some of whom were rather bearish on the whole idea at the start, have now been fairly well converted to the idea of F-P mixtures.

AC

The U.S.D.A. is reported to be considering a proposal to take over the grasshopper program completely in the drought areas. In previous years there was a three way split in cost among the federal government, the state government and the individual farmer. One reason why control was not pushed more strongly was that too many farmers were reluctant to come up with their third of the cost, with the result that there were too many gaps in control and infestations were allowed to build up. This year, with the drought areas in dire need of control to protect skimpy cover from being denuded further, it is reported, authoritatively we hope, that the federal government may take over the full burden of cost as a relief measure. If this report is accurate, we can think of no measure better designed to give farmers in the drought areas maximum assistance at minimum cost.

AC

The role of the aerial applicator in protecting truck crops may well decline over the next few years, in the opinion of at least one well informed pesticide expert. There are a number of interesting new developments in ground spraying equipment which are either here or just a step away, he believes, which may mean that in the future the aerial applicator's chief sphere of operations will be in the major spraying operations like the various forest spray projects. Aerial spraying of truck crops, he believes, may soon be restricted to periods when it is impossible to get into cultivated land with ground equipment.

AC

The ag chemical sales department of Dow Chemical reports a highly successful innovation at a recent sales meeting with the use of a closed circuit broadcast over the ABC radio network to outline sales support to Dow distributors. The broadcast was heard by over a thousand distributors and their salesmen at 35 regional meetings. This is believed to be the first time that closed circuit radio has been employed in the agricultural chemical business.

AC

The Ag Sell Company of Omaha is offering a farm clip book featuring a series of drawings by the well-known scratchboard artist, John Andrews. Farm animals and farm scenes are featured, for use in advertising, booklets, etc., wherever an authentic illustration will help to enliven agricultural copy.

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